ELECTRICAL TIMES

THURSDAY
17 APRIL
1952
NINEPENCE

HENLEY *Modern*

DISTRIBUTION PILLARS AND PANELS

GROUP 24

Embodied in the new HENLEY Distribution Pillars are all those features that keen distribution engineers are looking for, together with a shell of modern pleasing appearance.

Robust cast-iron construction throughout with detachable plinth and roof.

Adequate provision for ventilation.

One-piece insulating right-angle type shields acting as phase barriers and vertical front shields for busbars.

Four sizes of Units are available, 200 to 1,000 amp, suitable for 3-phase 4-wire systems with cartridge fuse-link protection up to 60 amp for fifth core, if required. Units for other systems can be supplied.

One-piece insulators with specially designed entry to facilitate insertion or removal of conductor fittings.

Conductor fittings are reversible and interchangeable. Crossing of conductor cores is avoided.

Height 3' 11" above ground. Depth 14½".

Please ask for Catalogue 24

W.T. HENLEY'S TELEGRAPH WORKS CO., LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

Self-supporting
High Heat Micanite

Having developed a special inorganic bond M. and I. are able to supply built-up mica, known as High Heat Micanite, which, like block mica, is self-supporting at high temperatures.

High Heat Micanite is specially suitable for unsupported electrical heating elements and resistances and it may be used as an alternative to block mica in many other applications.

With the growing requirements of the Defence Programme there are many instances where High Heat Micanite can be used instead of block mica with benefit both in respect of cost and delivery, with the added advantage that it is available in comparatively large pieces.

High Heat Micanite

1 Maintains its electrical properties at high temperatures.

2 Is suitable for unsupported electrical heating elements, surface heaters, all types of resistances and heating elements on voltages up to 600 where the temperature of the micanite does not exceed 500°C.

3 Is produced in thicknesses up to 0.060″: density 2.4 to 2.5. (To ensure adequate mechanical strength a minimum thickness of 0.020″ is recommended).

4 Is produced in flat pieces only (cannot be shaped or moulded.)

5 Is available in lengths up to 40″.

As the machining of High Heat Micanite requires special facilities and experience, M. and I. prefer to supply it in pieces cut to size and ready for use.

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Empire Works · Blackhorse Lane · Walthamstow · London · E.17

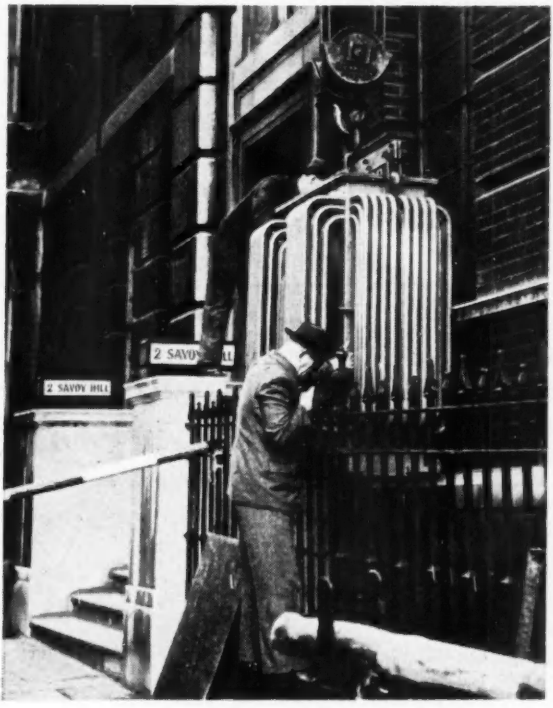
Branch Offices at Birmingham, Cardiff, Glasgow, Manchester and Newcastle-upon-Tyne and representatives in most countries throughout the world.

Manufacturers of Micanite (Built-up Mica Insulation). Fabricated and Processed Mica. Paxolin Laminated Materials. Panilax Laminated Materials and Mouldings. Empire Varnished Insulating Cloths and Tapes. High Voltage Bushings and Terminals. Distributors of Micoflex-Duratube Sleevings, Micoflex-Durasleeve (Plastics-covered flexible metal conduit) and Kenutuf Injection Mouldings (P.V.C.)

'ENGLISH ELECTRIC'

transformers

Sub-station Transformers for Confined Spaces



Installing transformers in the confined areas of existing buildings in cities has frequently presented supply engineers with many difficulties. To meet these circumstances 'ENGLISH ELECTRIC' developed sub-station transformers with their overall dimensions reduced to a minimum.

Several of these low loss transformers rated at 500 kVA are to be used in the London area while other sizes below 500 kVA for service up to 11 kV are also made.

The illustration shows an 'ENGLISH ELECTRIC' 500 kVA transformer being lowered into a sub-station at the headquarters of the Institution of Electrical Engineers.

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Transformer Department, Liverpool

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

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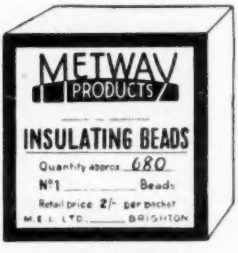

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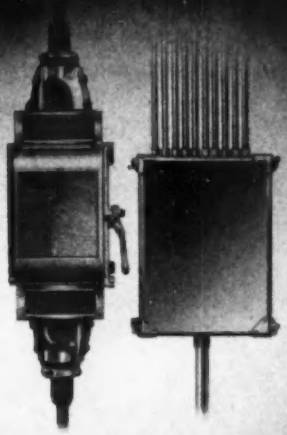

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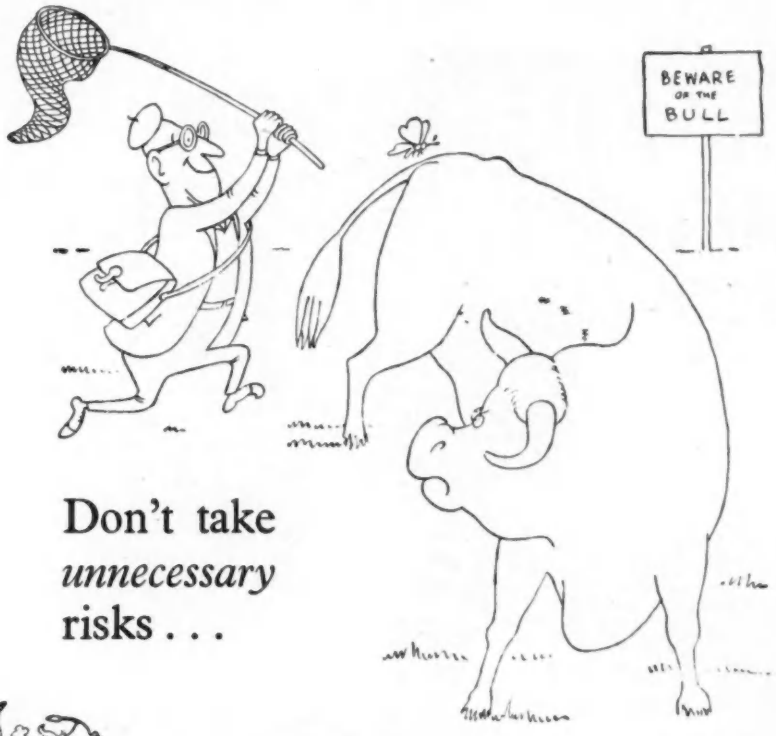

Don't take *unnecessary* risks . . .

IT looks a 'natural'—a rare and golden opportunity; but see the trouble it causes this near-sighted naturalist. Yet it's so *easy* to be misled by appearances—every day someone or other is finding himself on the horns of a dilemma through leaping before he looks. Not only light-hearted butterfly hunters, but hard-headed business men—it's just as easy to be led astray in the factory as in the field. You take a leap in the dark, for instance, every time you buy important components of uncertain quality. And speaking of leaps, let's talk about Springs . . .

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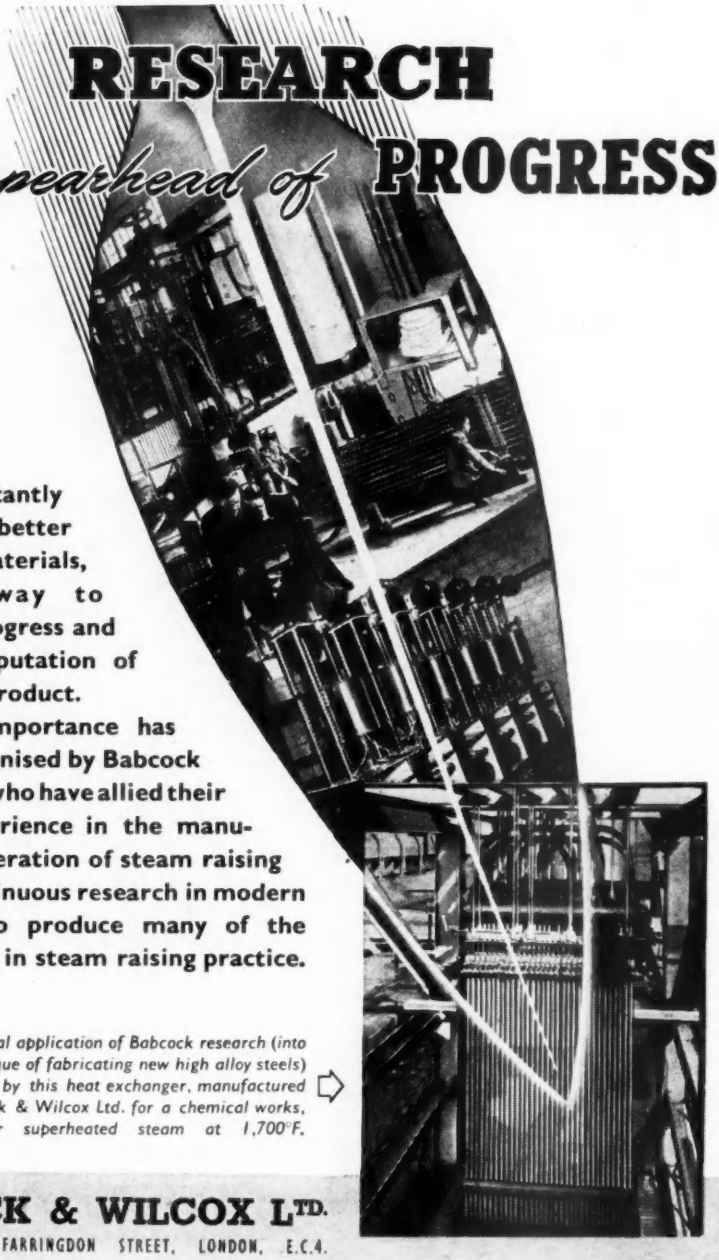

Research, constantly probing to find better methods and materials, points the way to engineering progress and guards the reputation of the industrial product. Its primary importance has long been recognised by Babcock & Wilcox Ltd., who have allied their unrivalled experience in the manufacture and operation of steam raising plant, with continuous research in modern laboratories, to produce many of the major advances in steam raising practice.

Commercial application of Babcock research (into the technique of fabricating new high alloy steels) is typified by this heat exchanger, manufactured by Babcock & Wilcox Ltd. for a chemical works, to deliver superheated steam at 1,700°F.

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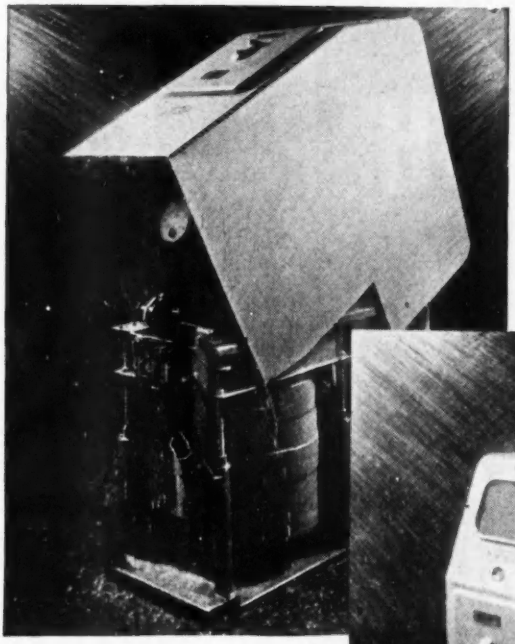

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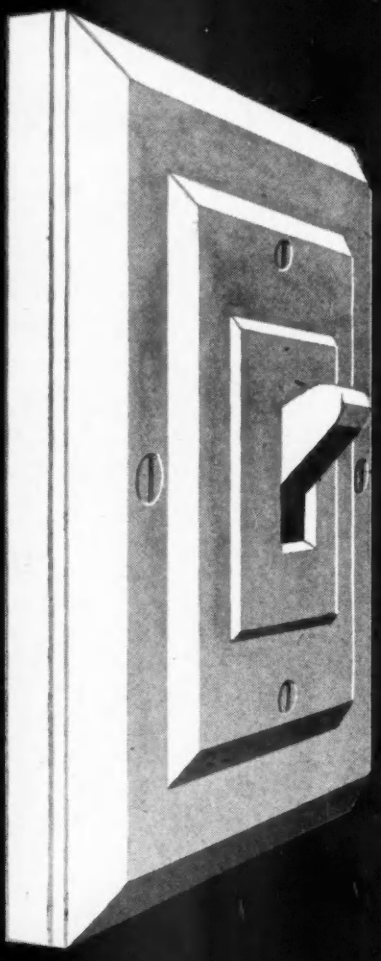
SURFLUSH

THAT LOOKS FLUSH

the surface switch that looks flush



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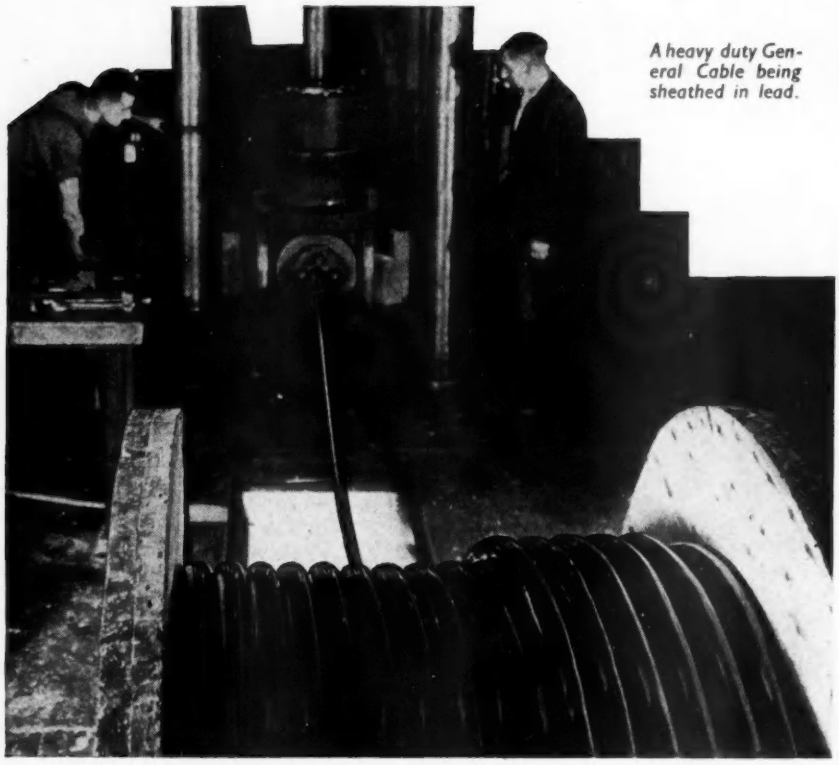

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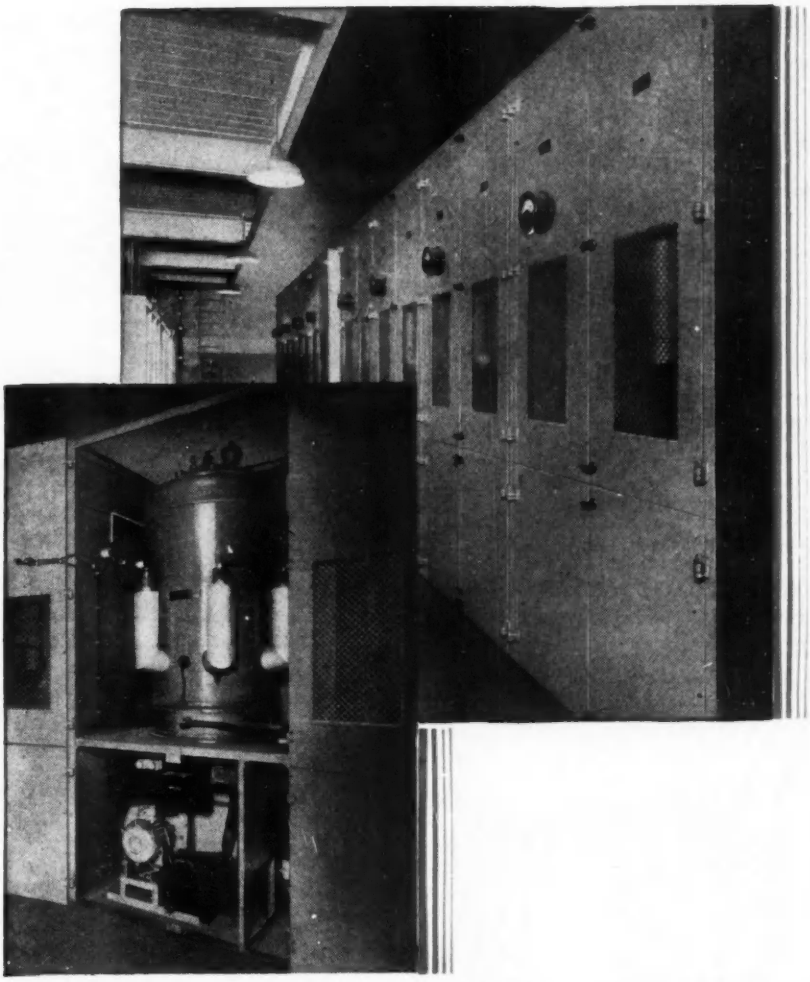

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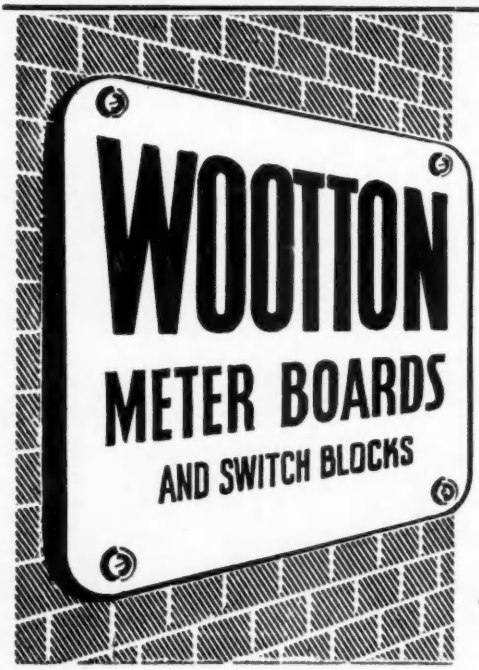

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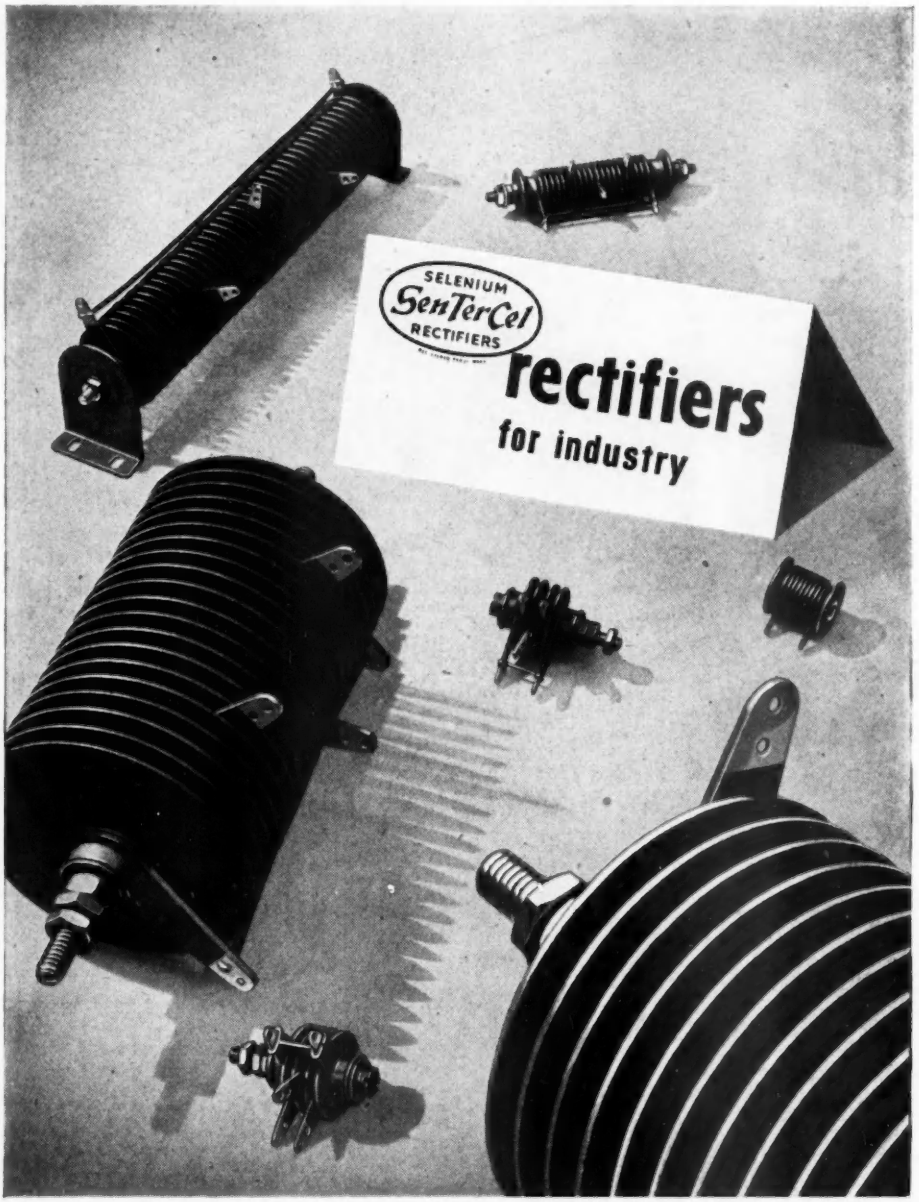

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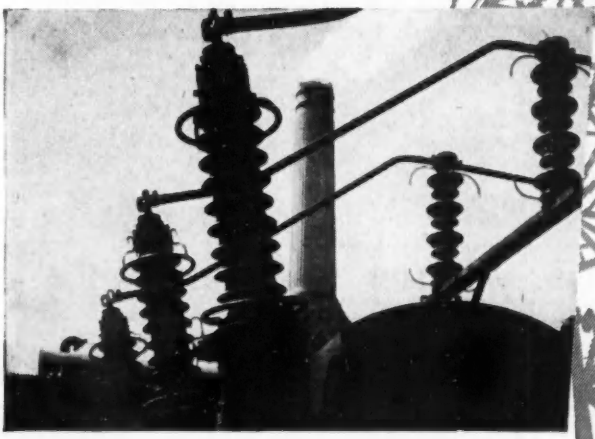
P & G BATTERIES in the public service



P & G Batteries play an important part in maintaining the efficiency of Britain's giant grid system. In countless substations where the flow of energy is broken down to comply with local needs, there you will find P & G Batteries operating vital switchgear or providing emergency lighting should the mains supply fail. The P & G service extends into many spheres, a natural result of 60 years' experience of battery manufacture and development. In round terms here it is. **1.** *Technical Advice and Specifications.* **2.** *Complete equipment and installation.* **3.** *Regular inspection and report.* A discussion of your scheme may help. We are always ready to agree that two heads are better than one.

2 *heads are better than* **1**

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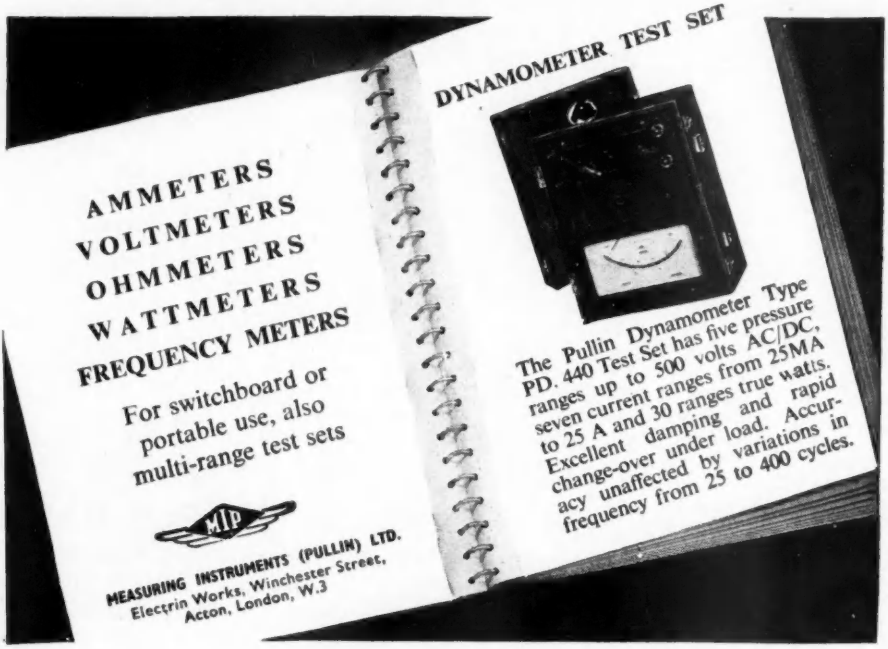
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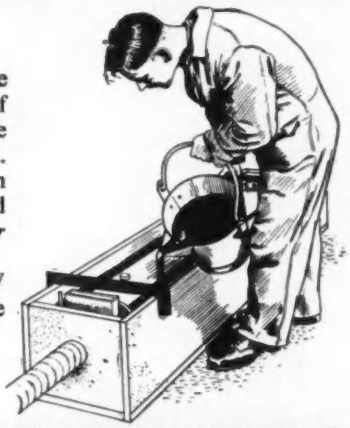

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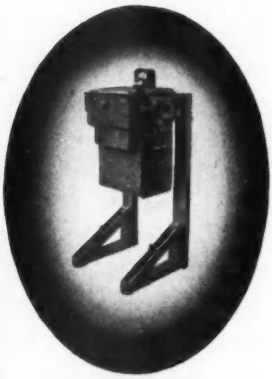
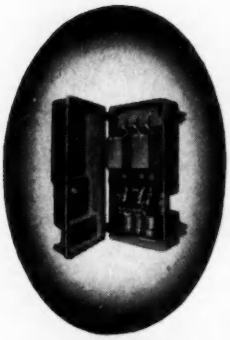
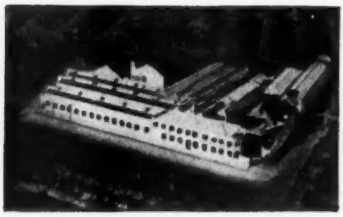
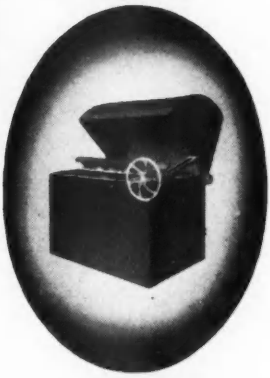
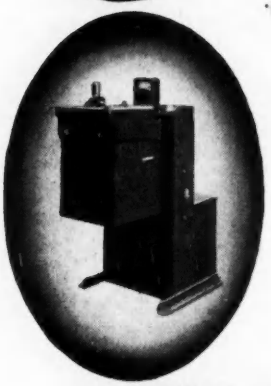






We shall be especially pleased if you would call at the Lancashire Switchgear Works in Manchester to see where 'Erskine Heap' Switchgear and Motor Control Gear is manufactured.





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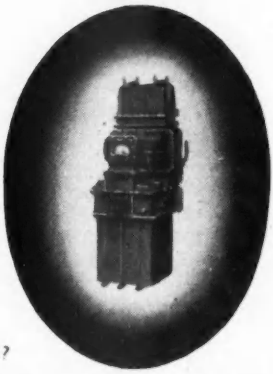

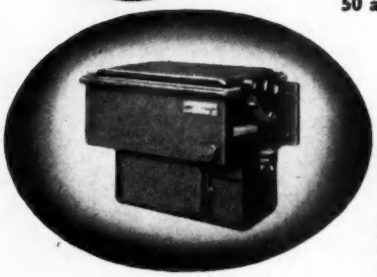

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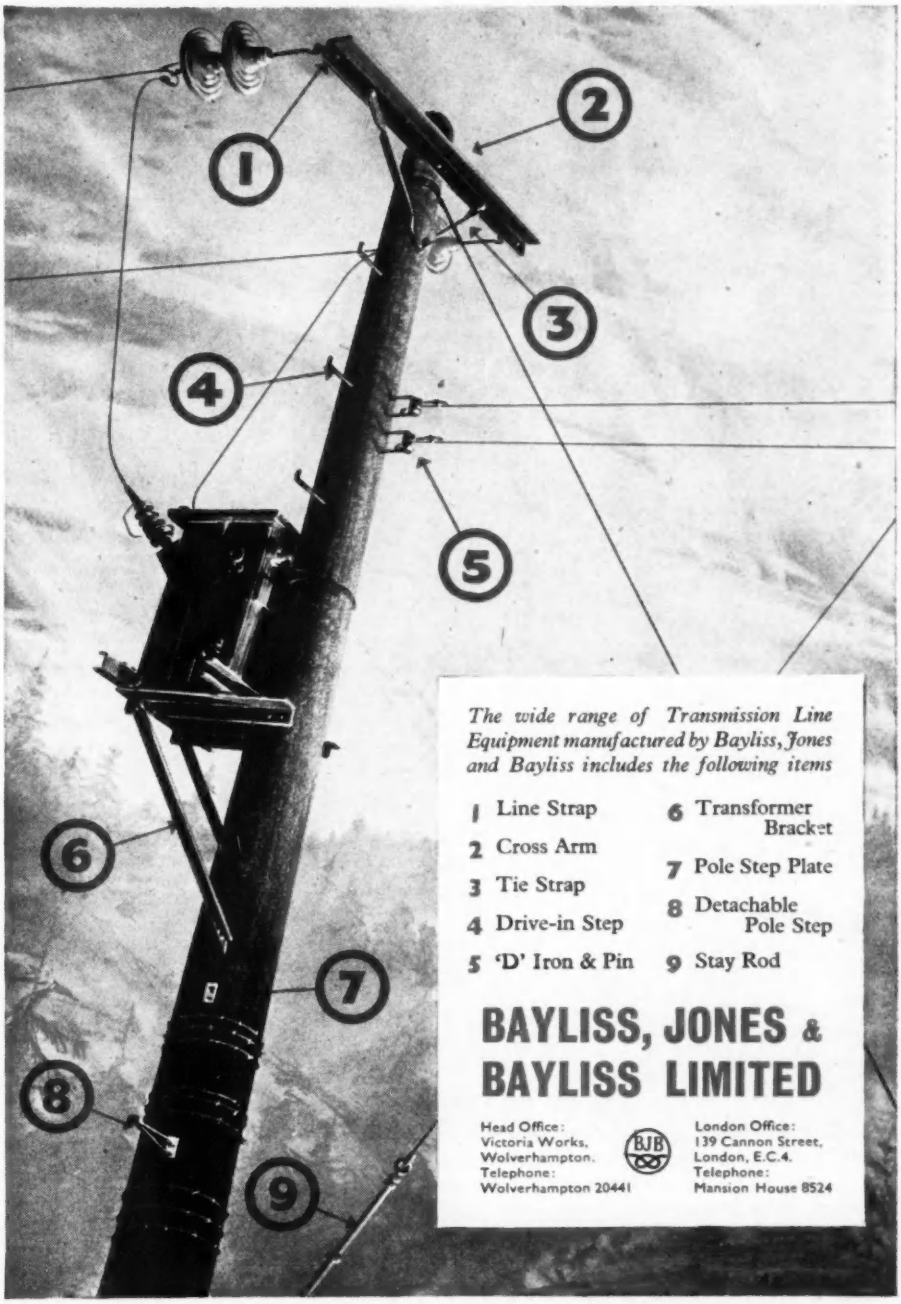

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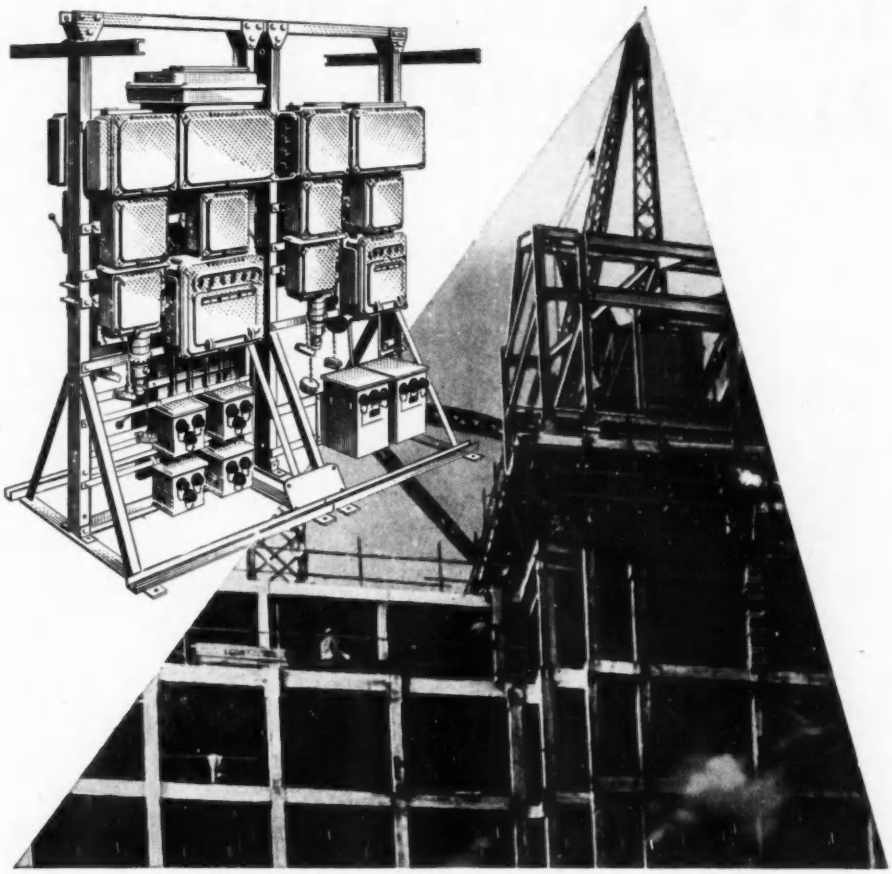

An outstanding feature of H distribution gear is its compactness and adaptability.
For example, by virtue of the unit-construction principle it can provide a safe and transportable means of local power and lighting control during large civil engineering activities. Sectionalised for ease in handling and with its self-supporting framework to which a temporary canopy can be fixed, the arrangement shown was designed for just that job.

Distribution Gear

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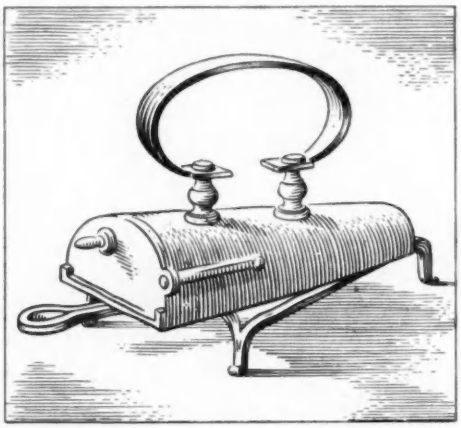
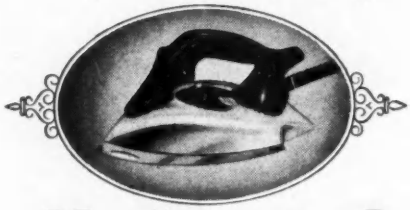
Aluminium Alloy Castings
to the
ELECTRICAL INDUSTRY



PERFECTION IS THE OBJECTIVE

THIS strange thing is probably the grandparent of all flat-irons. When one remembers the voluminous dresses and the number of garments worn in such an era, women needed considerable strength and no little courage to complete their ironing. No doubt the end justified the means. To-day women are more fortunate. The evolution of the iron is exemplified in the Hotpoint table and rotary ironers and their gleaming streamlined electric hand iron. The continuing effort that achieves such perfection applies equally to all Hotpoint electric appliances and whether it be washing, ironing or cleaning, refrigeration, ventilation or heating, breakfast, dinner or tea, Hotpoint domestic appliances help always the present day standard of living.



Hotpoint

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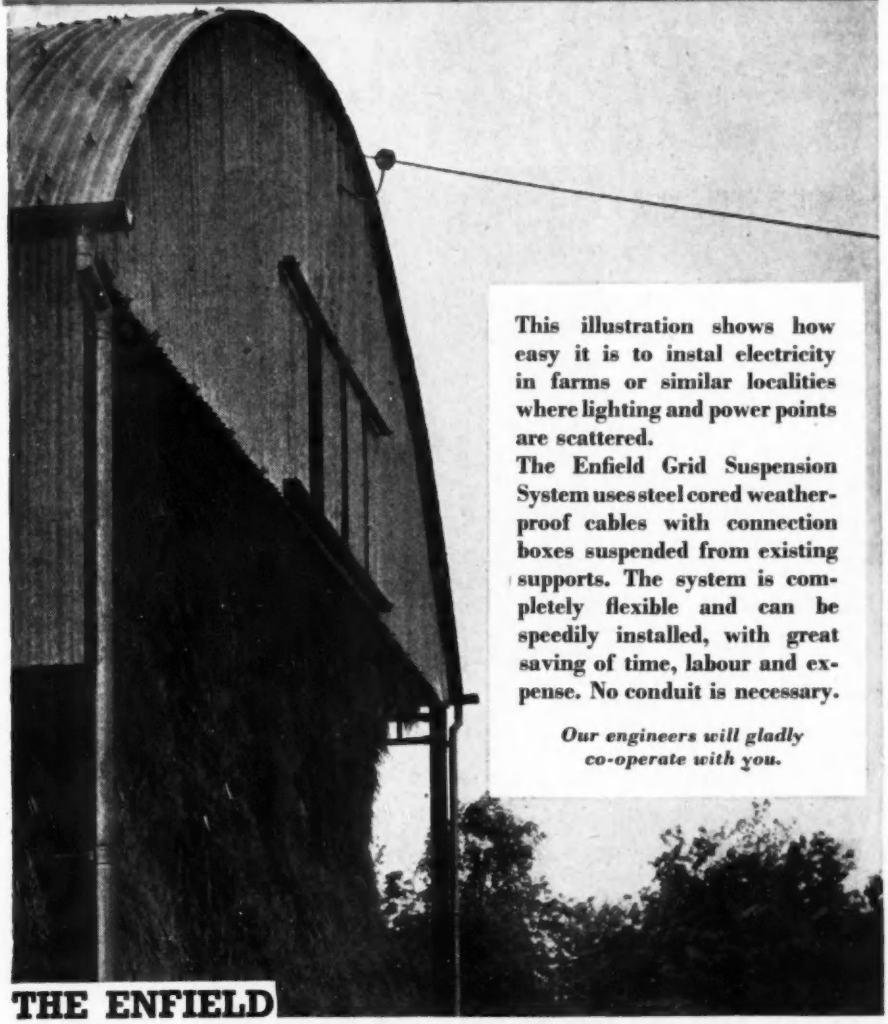
FARM ELECTRIFICATION



This illustration shows how easy it is to instal electricity in farms or similar localities where lighting and power points are scattered.

The Enfield Grid Suspension System uses steel cored weather-proof cables with connection boxes suspended from existing supports. The system is completely flexible and can be speedily installed, with great saving of time, labour and expense. No conduit is necessary.

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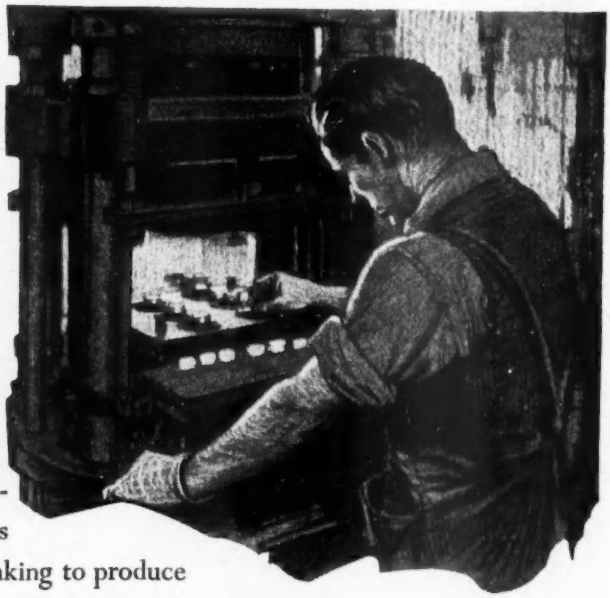
MAKERS OF WYLEX

The Plastic Moulder



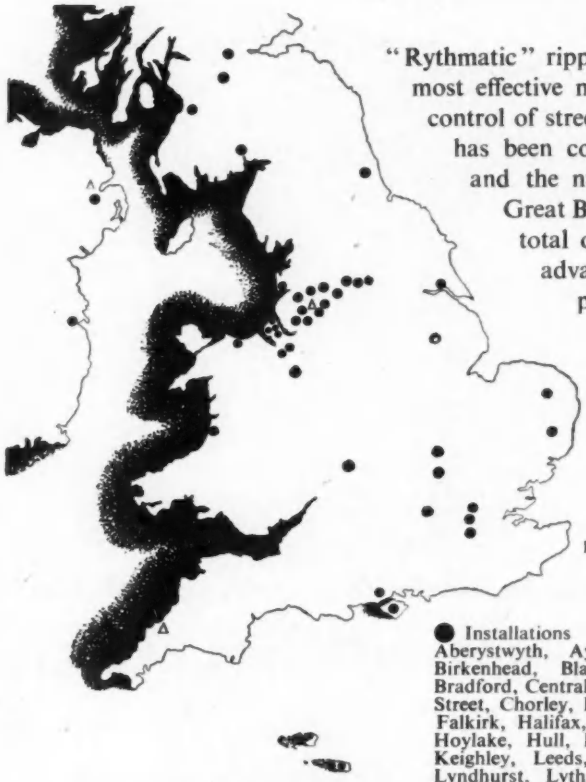
All mouldings for WYLEX products are made in the WYLEX Factory. The WYLEX Plastic Moulder knows that he has the finest plant and high class precision tools. With this knowledge he is painstaking to produce the best. He, and his work-mates in the WYLEX Moulding Shop, know "WYLEX must be good"—and they make sure of it.

Wylex

WYLEX GEORGE H. SCHOLES & CO. LTD., WYLEX WORKS, WYTHENSHAWE, MANCHESTER

The people who know most about ripple control — *SPECIFY* RYTHMATIC ★

FOR STREET LIGHTING CONTROL



"Rythmatic" ripple control has proved the most effective method for the centralized control of street lighting. Its application has been continuous and widespread and the number of installations in Great Britain exceed the combined total of all other systems. The advantage of the "Rythmatic" principle is that a single frequency only provides the required number of signals. Injection equipment and control relays are simple in design, resulting in negligible maintenance requirements.

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★ 'RYTHMATIC' *is the registered trade mark of Automatic Telephone & Electric Co. Ltd.*

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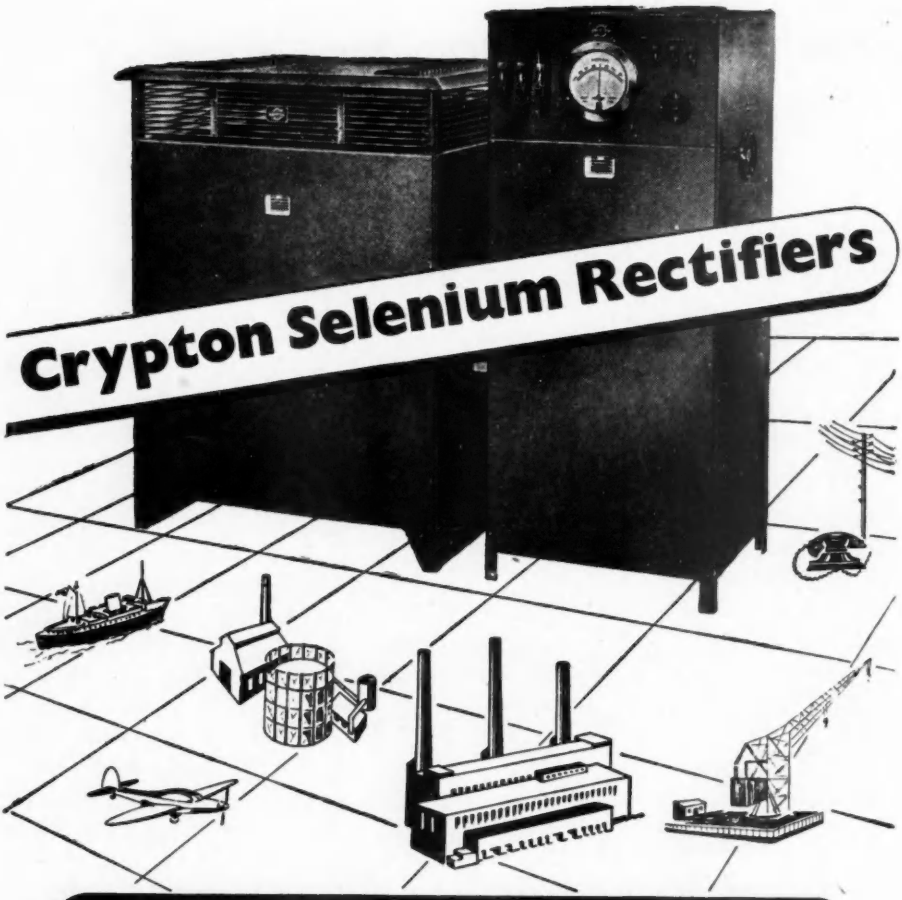

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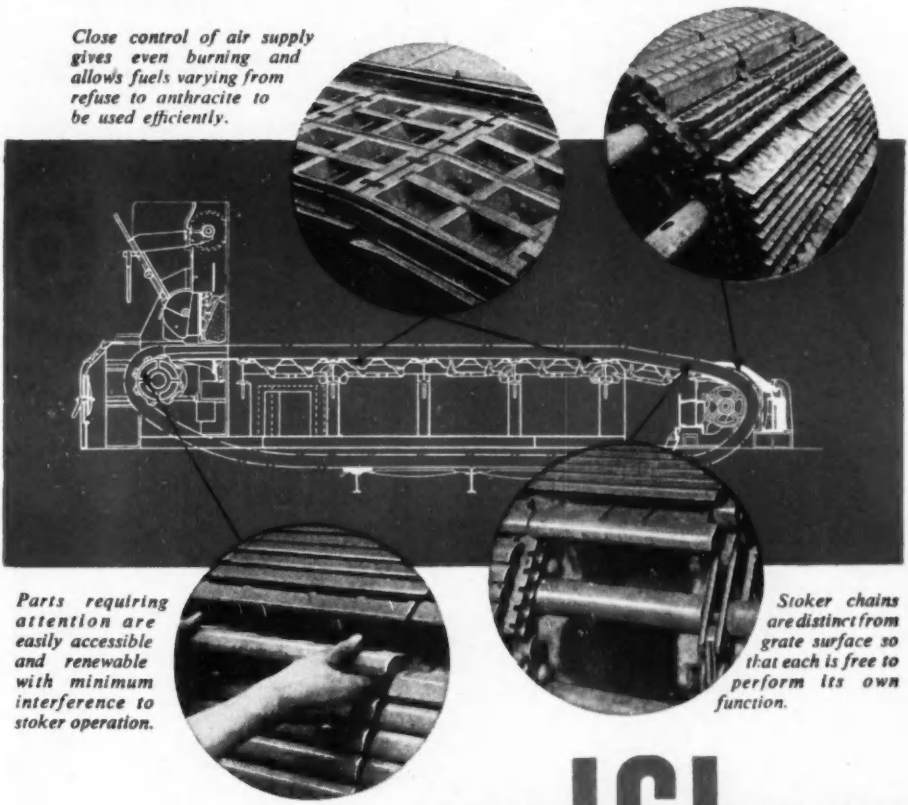
All over the world "L" type Travelling Grate Stokers are firing every known design and size of water-tube boiler. They have been specified for many of Britain's newest generating stations and factories. In power stations and industrial plant alike the "L" Stoker is known for its high burning efficiency and remarkably low maintenance.

Automatic cleaning of fire bars, which are free to grow without affecting efficiency.

Close control of air supply gives even burning and allows fuels varying from refuse to anthracite to be used efficiently.



Parts requiring attention are easily accessible and renewable with minimum interference to stoker operation.

Stoker chains are distinct from grate surface so that each is free to perform its own function.

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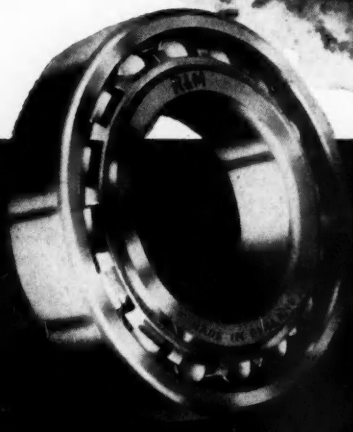

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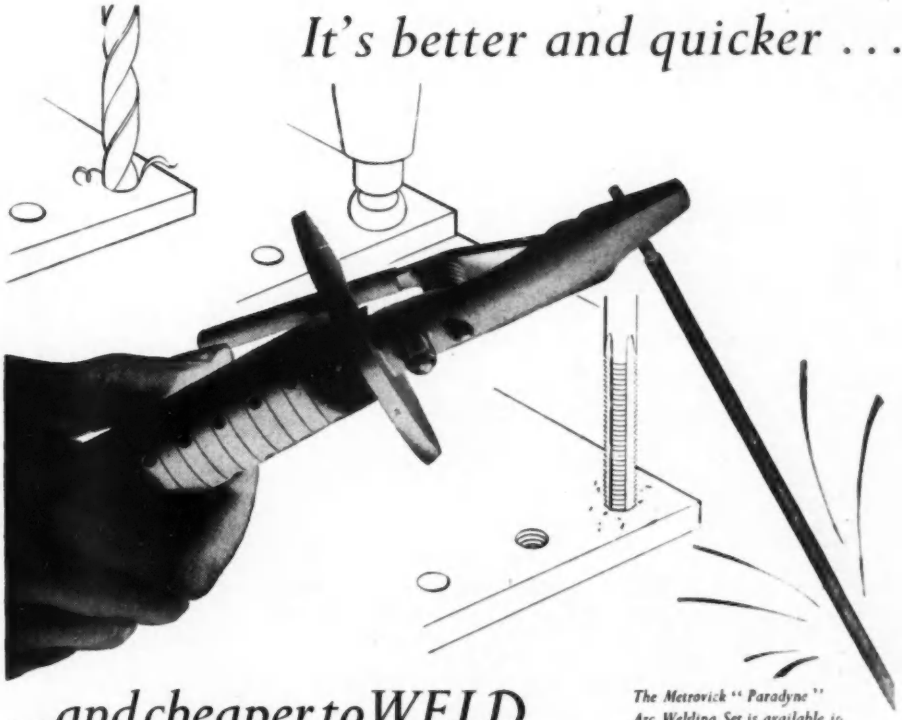
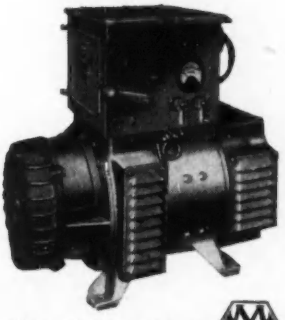


. . . and cheaper to WELD

The Metrovick "Paradyne" Arc Welding Set is available in two sizes—300 amperes or 400 amperes maximum.



In many workshops, too much time is spent drilling, riveting and tapping as a means of joining metal structures. The modern production shop saves time and lowers its overall costs by welding with M-V equipment. Metropolitan-Vickers make many types of welding plant and, in addition, are themselves one of the biggest users of welding equipment. For expert opinion on welding plant or practice, consult Metrovick, the makers who use the plant they sell.

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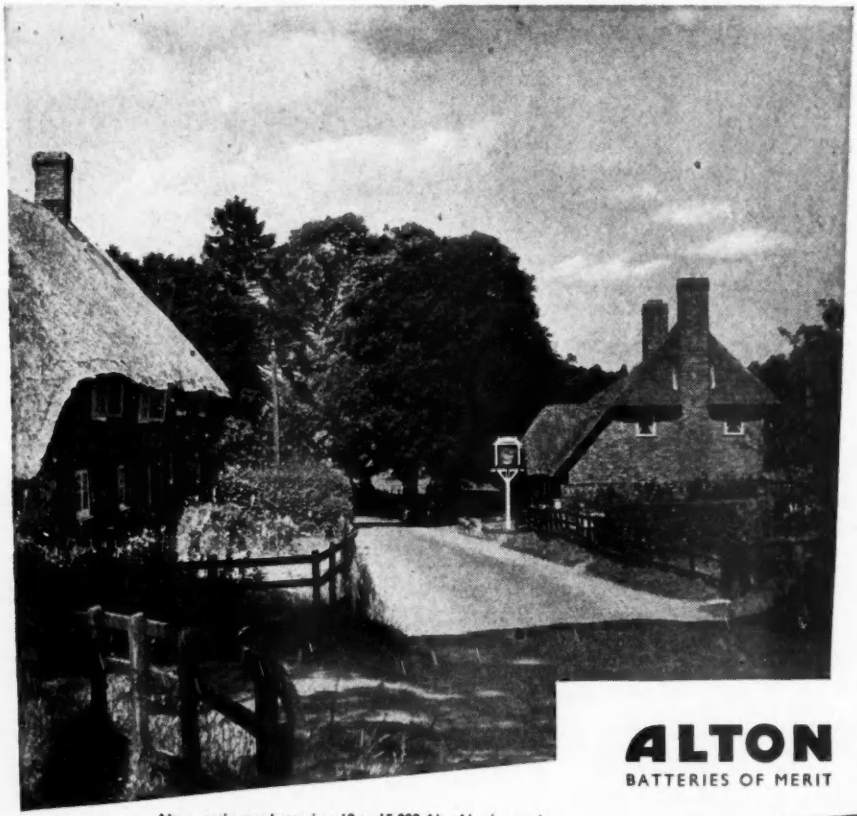
METROVICK *Equipment for More Efficient Welding*

J/E001

Know this village? If you worked at the Alton Battery works you'd know it well—and a dozen others like it. You'd know the lanes that lead to each. You'd know the streams—and the fish in them: the pubs and the beer they cool in their cellars, the teas they serve on their lawns. . . . Alton's a country town—and the men it breeds are countrymen at heart. Men with roots in their birthplace. Men with a quiet pride in themselves and the patient skill of their hands. A clipped yew hedge in his garden . . . a battery plate at 'the Works' . . . *making something better than merely well comes very naturally to an Alton man.*



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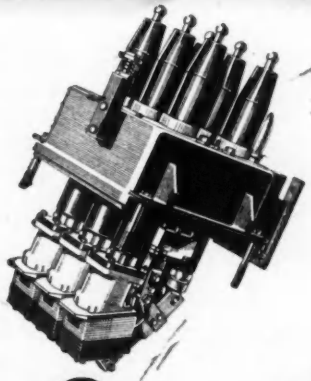

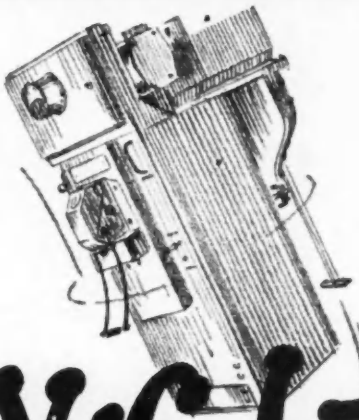

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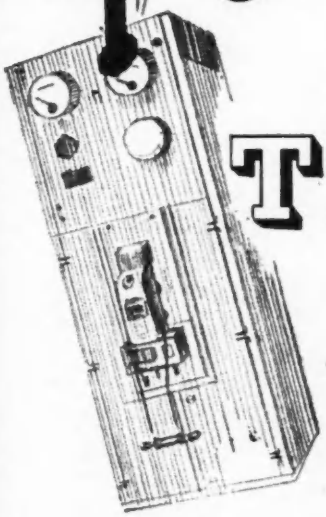
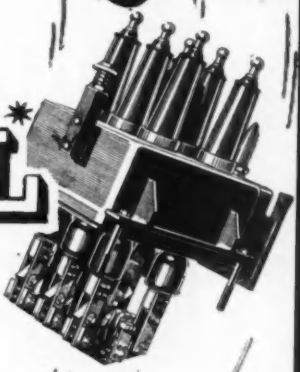
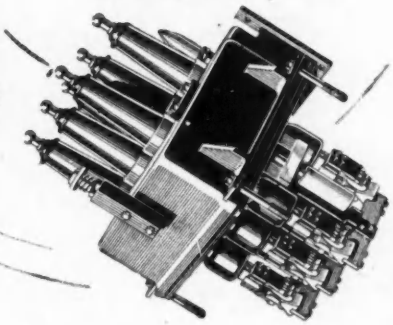
WITH J. & P. TRINAL GEAR







★ *The "three-fold" range that can save you pounds and pounds through interchangeability. Details in Publication SG. 86.*

Engineers will appreciate the advantage of being able to install a switchboard rated, for instance, at 150 MVA at 11 kV or 6.6 kV with the provision that at a later date it could be up rated to 250 MVA by the substitution of higher rated breakers.

The interchangeability of the Trinal Range permits such a conversion on site, and the initial reduction in capital expenditure is not achieved at the risk of possible future redundancy as the displaced breakers can be incorporated in other boards. The breakers are A.S.T.A. certified, and the oil switch is tested to B.S.116, 1937.

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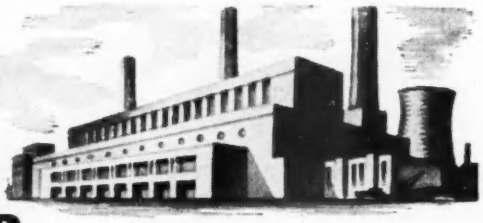
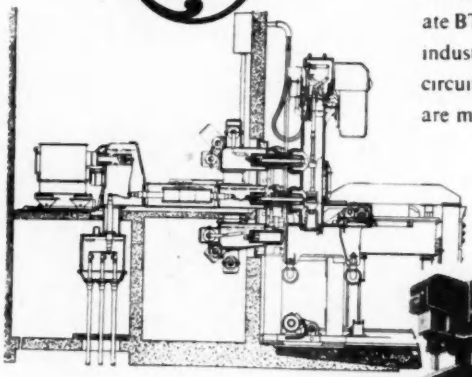


Central Station SWITCHGEAR

by

B T-H

Functional reliability of switchgear associated with the transmission of electric power is of paramount importance. Thus many of the world's largest electric supply systems incorporate BTH switchgear. All types from low voltage industrial distribution boards to the largest circuit-breakers for systems up to 300,000 volts are manufactured by BTH.



Cross-sectional drawing showing a typical duplicate busbar equipment.

1,000 MVA, 33 kV, class MF59 switchgear installed at the Ocker Hill Power Station of the BEA Midlands Division.

For all important installations
specify BTH switchgear

THE **BRITISH THOMSON-HOUSTON** CO. LTD., WILLESDEN, ENGLAND
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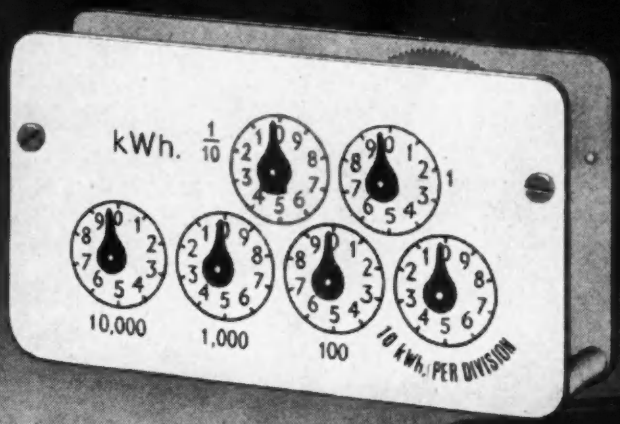

THE POINTER TRAIN

This registering mechanism is made of light alloys and has a very low friction level. The bearings have anodised surfaces and no lubricant is required.

This is but one of the many unique features of the Ferranti F.M. Meter, epitomising the cumulative experience of over 60 years of meter design and manufacture.

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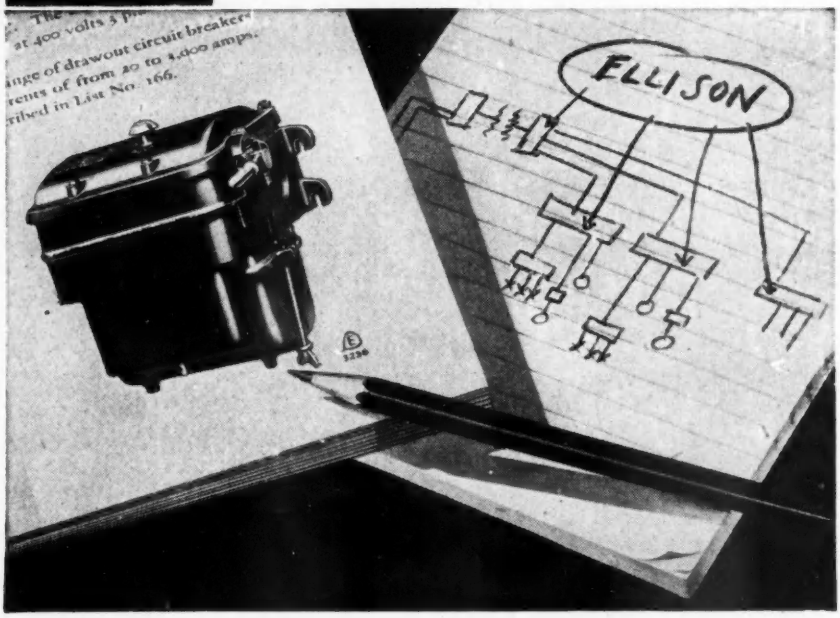

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ELECTRICAL TIMES

Vol. 121 No. 3154 THURSDAY, 17 APRIL, 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

D.C. Shunt Motors Driving Variable Speed Loads, *by R. Wells, A.M.I.E.E.* 703
Encouraging Design in Industry 706
Our Readers' Views 707
Notes on Wiring, *by Megohm* 709
The Alcan Project 710
Cooking for 1,000 Employees 713
Problems and Practice in Engineering 714
Oil Under Water 715
The R.E.C.M.F. Exhibition 716
Standardised Motor Dimensions 718
Canadian Water Power 719
Electrocuting Whales 720
Cable Drum Manipulation 721
Overseas News 722
Personalities in the Industry 724
New Literature 727
The Buyer's Column 728
The Week in News 730
Questions in Parliament 735
Electric Supply News 735
Company Activities 736
Commercial Information 738
Classified Advertisements *43*
Index to Advertisers *50*

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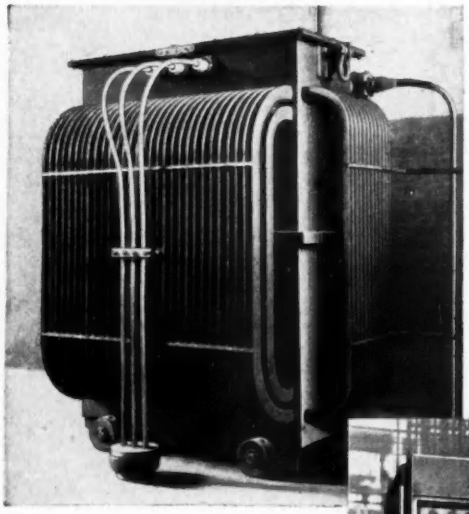

(ABOVE) One of two 1,000 kVA 11 kV/400-230 volt Stepdown Transformers, at Frankley pumping Station Birmingham.

(OPPOSITE) A Mercury-arc rectifier providing a 300 amp. general load in a works Substation.

ESTABLISHED 1882

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Manufacturers of Electrical Machinery, Switch and Control Gear, Transformers and Rectifiers.

Editorial

INQUISITION ON PLANT

IT has frequently been remarked that good organisation in an industry makes government interference a relatively easy matter. This certainly seems to be the case with electrical manufacturers so far as the Monopolies Commission is concerned. First of all, the electric-lamp section was inquired into minutely, without discovery of any terrible activities; next came wires and cables. Now, while the report on the latter is being printed, the Board of Trade has decided to keep the pot boiling by referring to the Commission the supply and export of heavy electrical machinery and plant. The subject has, of course, been on the Board's books as a "possible" for some time; what is rather surprising, however, is to find the export activities specially included in the terms of reference. It seems unlikely that the manufacturers concerned have much to be ashamed of here, for "the public interest" noted as a criterion in the reference has been well served by an outstanding export achievement in the heavy electrical machinery sector. One example may suffice. Last month—and this was not a record—the E.T. Export Index for the appropriate plant stood at 181 per cent. of the 1947 level. Further still, the downward trend in the terms of trade since the war has led to the complaint that our overall export prices have been too low. Does the case really merit the time-consuming machinery of a monopolies inquiry?

COAL THE LIMIT

OF the many factors that have to be considered in deciding the maximum size of generating sets to be operated in this country, the quality of the coal available is perhaps one of the less obvious. Yet this, as was pointed out recently by Sir John Hacking, sets an upper limit to the size of plant that is likely to be installed in the near future, suggesting that this will be 120 MW. This is well below the largest turbo-alternator rating that could be built with present knowledge and materials and this limit results from the B.E.A.'s conviction of the outstanding advantages of the unit principle of boiler arrangement in the largest stations. In its turn, this decision brings boiler capacity into the question, and in particular draws attention to furnace design as the crux of the matter. It is here that coal quality, and its consistency, has a determining effect. Judging from recent designs, the unit boiler for a 120 MW set would be rated at about 1,000 klb/hr for operation at the international standard conditions of 1,500 lb/sq in., 1,050° F. In this connection the coal specification, mentioned recently by the Technical Officer to the W.T.B.A. as applying to a 60 MW boiler comes to mind; gross calorific value as used 7,650 B.Th.U., with 25 per cent. ash content on a dry basis. With such difficulties to be faced, it will be a major achievement to reach even this 120 MW level.

COMPONENTS STANDARDS

SINCE the war, the Radio Industries Council has published a number of performance specifications for radio components, and this was done as a first step towards a series of British Standards which would cover their use in industry and the Services. By associating a specified level of humidity with each temperature rating, they succeeded in limiting the number of grades to three. On the other hand, the Services are now urging that the three humidity ratings should be independent of temperature which thus leads to the creation of nine grades. While it is fully recognised that the requirements of the Services would in some cases demand specialised specifications, it is surprising that this number could not be reduced, particularly bearing in mind the resultant complicated pattern of store-

keeping that would result from nine grades. Although the welding of civilian and Service specifications is at the moment presenting some difficulty, it would seem that as the R.I.C. specifications have already received considerable support within the industry the ultimate B.S. specifications are not likely to require any serious departure from them. There is reason, therefore, why industry should be encouraged to use these standards, and this applies particularly in the field of electronics, which is perhaps not so closely identified with the Council as the radio industry itself.

CRANE ECONOMIES

CAREFUL consideration of crane design offers the possibility of some worth-while economies in power station construction. A few months ago we were able to record an ingenious method adopted for a Cyprian station, where the arrangement of the turbine house with removable roof slabs made possible the use of an external Goliath transporter crane, involving only one wall as a live-load bearing structure. Now comes news from the United States of a semi-outdoor station in which first cost has been effectively kept down by another departure from normal crane design practice. This time the answer has been to make the crane strong enough by normal design standards for a lift of only 45 tons. This is quite sufficient for all likely duties once the station is completed, but during construction four lifts of 103 tons are required. Despite the overloading involved, these are being allowed: effectively, the factor of safety is being reduced to two for these lifts. As the "overloading" will take place early in the life of the crane it was thought the risk was worth taking.

SHOWROOM DENSITY

CAPE TOWN CITY COUNCIL has decided to close all but one of its electricity showrooms. The prime reason given for closing the showrooms after some 20 years of operation is a drive for economy, in the light of which there seems to be a redundancy. Originally, it is argued, the showrooms were set up to get the populace of the Cape electricity minded and to show them the range of appliances that were available for use. But now the idea of electricity on home and farm is completely accepted, while the display of equipment and the mode of its use are being done by reliable contractors. As for the payment of accounts, it is felt that this can be provided for more cheaply in other ways. To appreciate these arguments, however, it is necessary to put the proposed reduction in the right perspective. Roughly, this may be said to be a reduction from the level of showroom service, provided by some of the more generous-minded area boards in this country, to something approaching half that of boards more cautious in the provision of service centres. It does, therefore, focus critical attention once more on the cost of providing a higher standard of service to consumers and on the approximate determination of an optimum density of service centres in any given type of area.

HUSH-HUSH COMPLAINT

PUBLIC confidence in the independence of consultative councils has been built up on the open way in which, in many areas, they have conducted their business. This has, of course, involved revealing the complaint as well as the answer to it. A complication has now appeared with the claim by one complainant that the copyright of his letter to the council remains in his possession: if it is revealed, for instance, to the Press at a meeting, and published, an action may lie for infringement. No doubt consultative councils are as sensitive to the threat of legal proceedings as any other public body, but it will be a great pity if, as a result of this position, the outspokenness that has enlivened some council meetings has to be toned down by careful phrasing to ensure that Press and public cannot recognise who is being discussed. Happily, there seem to be indications that the councils are regarding the problem in a common-sense manner and will not be panicked by an isolated case with some unusual features.

Meteor

D.C. Shunt Motors driving Variable Speed Loads

RELATIONSHIP OF ELECTRICAL AND MECHANICAL PARAMETERS

By R. WELLS, A.M.I.E.E.

THE speed of rotation of a d.c. shunt-wound motor may be reduced below normal by reducing the armature voltage below normal, and increased above normal by a reduction of the field strength below normal.

Use is often made of the last-mentioned fact in the case of a d.c. shunt-wound and shunt-connected motor operating from constant voltage mains, when a shunt regulator is used to insert resistance in the field winding circuit to reduce the field current and hence the field strength. This method provides a simple means of obtaining speeds higher than normal, but it is neither economical nor practicable to use a constant supply with resistance control of the armature voltage where it is desired to obtain speeds below normal. This is so for two reasons. Firstly, the power loss in the resistor would be too high. Secondly, for any given setting of the resistor the voltage applied to the armature (being the difference between the constant voltage supply and the voltage drop across the resistor) would diminish with increasing load, so that the effective speed regulation of the motor would be higher than normal. Further, the speed regulation would be dependent upon the amount of resistance in circuit.

To overcome this difficulty and provide satisfactory means of supplying the armature of a d.c. shunt-wound motor with a variable voltage, use is made of a Ward-Leonard set where the available supply is d.c., or of either a Ward-Leonard set or one of the many forms of variable voltage rectifier where the available supply is a.c.

Scope

Beyond the brief reference made above, no further mention will be made of the various types of equipment which may be used for the purpose of supplying and controlling a variable-speed d.c. shunt-wound motor, as it is not the purpose of this article to consider the advantages and disadvantages of such various equipment.

The purpose of this article is to show the inter-relationship between the relevant electrical quantities (field current, armature voltage and armature current), and the relevant mechanical quantities (r.p.m., torque, and horse power), when such an arrangement is used.

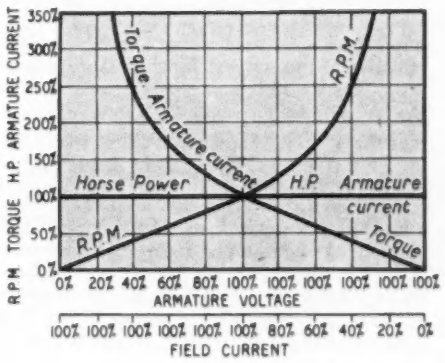
It is proposed to deal with the usual mode of armature voltage and field current control in which the speed is increased by bringing the armature voltage up from zero to its full value, the field current meanwhile being held constant at full value. Following upon this, the speed is increased above its nominal value by decreasing the field current, the armature voltage now being constant at full value. The effects that are produced by this speed variation are dependent upon the mechanical characteristic of the load, and therefore four different types of load are considered.

Simplifying Assumptions

In order to eliminate all secondary effects from these considerations, certain simplifying assumptions are made as follows. It is assumed that the motor is ideal, with zero armature resistance, field strength strictly proportional to field current, zero speed regulation and 100% efficiency.

The driven load and the motor may be assumed to have no inertia, in which case the

Fig. 1. Shunt motor characteristics when the load torque varies inversely as speed



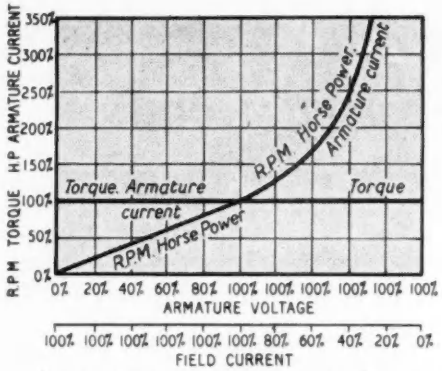


Fig. 2. Shunt motor characteristics with the load torque constant and independent of speed

conclusions arrived at hold good for static and dynamic conditions, or it may be assumed that the conclusions apply to static conditions only, in which case the existence or otherwise of mechanical inertia is a matter of no importance.

Basis of Presentation

A graph has been prepared for each of the four cases considered, and these have been scaled to present the quantities on a percentage basis so that the results may be universally applied. As far as armature voltage, field current and r.p.m. are concerned, 100% means the nominal full value as would be marked on the plate of a continuously rated machine, i.e. 100% armature voltage and 100% field current produce 100% r.p.m. The remaining quantities (torque, horse power and armature current) are shown using the same scale, with each having 100% value at 100% r.p.m. in all four cases. It will be understood that where these are shown as exceeding 100% it does not represent an overloaded motor. In practice, the motor rating will be chosen to suit the maximum loading—which will occur at the minimum speed if the load is constant horse power, and at maximum speed for the other types of load—and which in any case will depend upon the actual speed range. It follows that for torque, horse power and armature current, the ordinate scale can only be used in a comparative sense and that for a particular practical application a constant would need to be introduced for these quantities. There is a double abscissa to each graph consisting of the two quantities which affect the speed of the motor (r.p.m.), i.e. armature voltage and field current, and it is necessary to read these together. The other quantities are represented on the ordinate, the uniform percentage scale of which is common to them all.

It follows, then, that since an ideal motor is to be assumed, and since all quantities are presented on a percentage basis, it is possible to dispense with constants and derive the various characteristic curves directly from the following elementary equations:—

$$N = \frac{E}{I_F} \quad \ldots\ldots\ldots\ldots (1)$$

$$T = \frac{H.P.}{N} \quad \ldots\ldots\ldots\ldots (2)$$

$$H.P. = T \times N \quad \ldots\ldots\ldots\ldots (3)$$

$$I_A = \frac{T}{I_F} \quad \ldots\ldots\ldots\ldots (4)$$

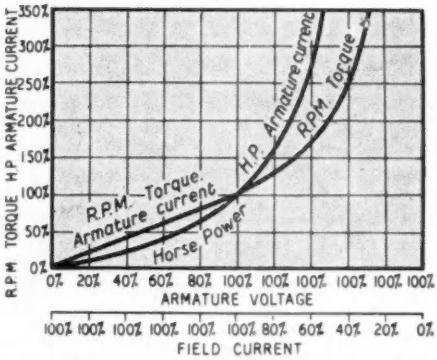


Fig. 3. Shunt motor characteristics when the load torque varies directly as speed

Where:—

N = Speed of rotation (r.p.m.) expressed as a percentage of full nominal value.

E = Armature voltage expressed as a percentage of full nominal value. Note that since it is assumed that the motor is ideal, it is not necessary to differentiate between induced armature voltage and terminal voltage.

I_F = Field current expressed as a percentage of full nominal value. Note that the useful flux per pole is strictly proportional to I_F.

T = Torque expressed as a percentage of full nominal value.

H.P. = Horse power expressed as a percentage of full nominal value.

I_A = Armature current expressed as a percentage of full nominal value.

Mechanical Characteristic

The four types of load dealt with may be defined by reference to their torque and horse power/speed relationship as follows:—

1. Torque varies inversely as speed, so that

the horse power is constant and independent of speed.

2. Torque constant and independent of speed, so that the horse power varies directly as speed.

3. Torque varies directly as speed so that the horse power varies as (speed)^2.

4. Torque varies as (speed)^2 so that the horse power varies as (speed)^3.

It is now proposed to consider each case in detail.

CASE 1.—LOAD TORQUE VARYING INVERSELY AS SPEED.

Refer to Fig. 1.

The speed curve is plotted first using equation (1). For the first part, where the field current is constant, there is a direct linear relationship between speed and armature voltage, so that the result is a straight line passing through the origin and the 100% points. For the second part, where the armature voltage is constant, there is an inverse relationship between speed and field current, so that the result is a reciprocal curve tending to infinite speed at the zero field current asymptote.

As in this case, the mechanical characteristic of the load is such as to make the horse power constant, the next step is to draw the horse-power line. Having done this, the torque line may now be plotted using equation (2) as values of horse power and speed are now known. The result, of course, is that the torque curve is a mirror image of the speed curve, as

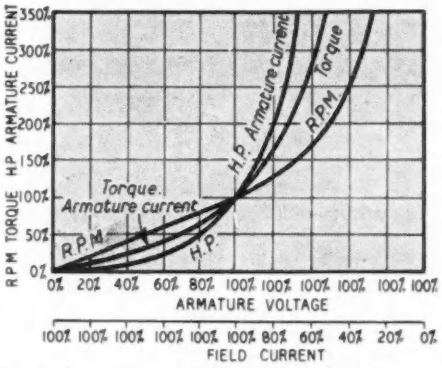


Fig. 4. Shunt motor characteristics with load torque varying as the square of the speed

the product of these two quantities is always equal to the horse power, which is of constant value.

The armature current may now be plotted using equation (4), as values of torque and field current are now known. For the first part, where the field current is constant, the armature current curve is identical with the torque curve. For the second part, where torque and field current are diminishing together, the armature-current curve remains constant and identical with the horse-power line.

It will be obvious from Fig. 1 that where the load is of a constant horse-power characteristic, speeds below normal, which are achieved by reduction of armature voltage, can only be obtained at the expense of proportionately high armature currents. This means, for example, that in this application a motor must be rated for twice the load horse power if the speed is to be variable down to half value, and three times load horse power for one-third speed, etc. In some such cases it may be possible to make use of the overload rating of a nominal horse-power machine for short period running at reduced speed, but the fact remains that the correct motor size for any particular application is governed by the principle set out above. If possible, it is best to arrange for the minimum required speed to coincide with the nominal motor speed and to confine speed regulation to field-current control.

CASE 2.—LOAD TORQUE CONSTANT AND INDEPENDENT OF SPEED.

Refer to Fig. 2.

Speed curve as before. In this case, the mechanical characteristic of the load is such as to make the torque constant and this line is drawn next.

The horse-power curve may now be plotted using equation (3) as values of torque and speed are now known. Now as the torque is constant the horse-power curve is identical with the speed curve.

The armature current may now be plotted using equation (4) as values of torque and field current are now known. Again it is found that this curve is identical with the torque curve for the first part and identical with the horse-power curve for the second part.

The indication here is that as the armature current does not exceed nominal value at low speeds and merely increases as horse power at high speeds it is not necessary to use a motor having a horse-power rating in excess of the load horse power. It remains only to match the motor rating to the horse power of the load at maximum speed.

CASE 3. LOAD TORQUE VARYING DIRECTLY AS SPEED. Refer to Fig. 3.

Speed curve as before. In this case the mechanical characteristic of the load is such as to make the torque vary directly as the speed, in which case, the torque line is identical with the speed line.

The horse-power curve may now be plotted using equation (3) as values of torque and speed are now known.

Since the horse power is proportional to the product of torque and speed, and since these two quantities are represented by identical curves, the horse power may be viewed as proportional to either (torque)^2 or (speed)^2 and the horse-power curve is the square of the r.p.m./torque curve.

Armature current as before is identical with torque for the first part, and with horse power for the second part.

The same inferences in regard to motor rating relative to load horse power may be drawn as for Case 2.

CASE 4. LOAD TORQUE VARYING AS (SPEED)^2. Refer to Fig. 4.

Speed curve as before. In this case the mechanical characteristic of the load is such as to make the torque vary as the (speed)^2. The torque line is therefore plotted on this basis from the already plotted speed curve.

Again the horse-power curve is plotted using equation (3) and the speed and torque curves already plotted. As horse power is proportional to the product of torque and speed, and as torque is porportional to (speed)^2 it follows that the horse-power curve is also proportional to (speed)^3.

Once again armature current is identical with torque for the first part—as it always will be if the field current is constant, and it is identical with horse power for the second part—as it always will be if the armature voltage is constant.

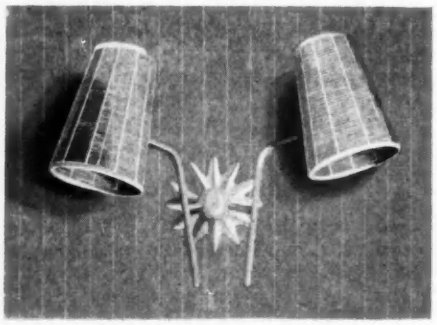
Again, as in all cases except Case 1, the motor rating must be chosen to suit the load horse power at the required maximum speed.

Practical Cases

It will be appreciated that, in practice, while many loads have characteristics which follow quite closely the pure forms as described, there will in every case be some discrepancy. Also it will be found that some loads have a complex characteristic—starting off by following one law at low speeds and changing with speed to follow another law at higher speeds. This fact makes it very difficult to deal with all practical cases in detail, but it is hoped that having dealt with four pure forms of load it will assist in the analysis of any particular practical case.

ENCOURAGING DESIGN IN INDUSTRY

SINCE 1938 the Royal Society of Arts has organised annual competitions to encourage the development of industrial art, awarding Bursaries of £150 in value for designs of various consumer goods, including domestic electrical appliances and lighting fittings. The result of the 1951 competition has just been announced. Mr. D. H. Powell, of Leigh-on-Sea, has been awarded a £150 bursary for his design for an electric hotplate, of which the top would be in a light alloy, and the combined handles and legs in phenol formaldehyde. A design for a coffee percolator in aluminium, with Pyrex glass lid, body finished in chrome with handle and lid knobs in black bakelite, submitted by Mr. B. Walter, of Chislehurst, gained special commendation. In this section, the judges included Dame Caroline Haslett and Mr. Victor Dale.



Top: Mr. Powell's idea for a hotplate. Left: Mr. Evan's wall fitting design

In the electric light fittings section, a £100 bursary was awarded to Mr. D. R. Evans, of Walsall, and of £25 each to Miss A. M. Sinclair, of Banstead, and Miss B. D. Barton, of Fetcham. Mr. Evans' design, for a sitting room, depicts a wall bracket to hold 40 W lamps, with rayon netting covered shades, the cast brass star backplate being finished in white enamel. But the jury in this section have drawn attention to the limitations of some of the designs, which gave no indication of how the wiring would be carried out! An exhibition of the designs will be held at the Royal Society of Arts from May 19 to 30.

Our readers' views . . .

Wagons on Tipplers

I SHOULD like to join issue with J. D. Harrison in "Our Readers' Views," April 3 issue.

Capital investment in tipplers becomes heavier with the new types now appearing, power costs for operation rise with increased weight of wagon and load, both of which are rising with the passage of time. Is it such a Utopian idea to reduce the mechanical equipment necessary to unload a railway wagon to a simple shoot between the rails, involving less excavation than the latest side tippler and no mechanism other than the feeder beneath the shoot, and, moreover, no power to operate it?

Furthermore, does it occur to Mr. Harrison that the steel coal wagons now appearing on the railway in their thousands have only recently been built, and are still being built, brand new, and that a decision to use self-discharging wagons for coal would involve merely the construction of a somewhat different type of wagon, and not the conversion of thousands of existing wagons?

I could supply reasons for retaining the existing design of coal wagon and the retention of tipplers, reasons more potent than Mr. Harrison's, but if British Railways are prepared to use a special design of self-discharging wagon for their ballasting materials, and if industry feels it wise to use similar means for handling all kinds of local bulk loads in works, which they do, then surely it cannot be a Utopian idea, and Mr. Roberts' suggestion is very far from unreasonable.

I feel that Mr. Harrison should go more deeply into the pros and cons of this matter before condemning it so roundly. Has he had the experience of endeavouring to maintain the pernicious tipplers with which many of our works are saddled, and of meeting the repair charges for damaged trucks?

S. P. Herbert

B.Sc.(Eng.), A.M.I.Mech.E., M.Inst.Gas E.

HONOR OAK

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Use of Explosives

I AM certain that Mr. R. Leonard in his article, "Blasting for Line Erection," in your issue of March 13, does not wish to give the impression that the correct mental approach to the use of explosives is in any way similar to that in setting off fireworks. With this in mind, the following observations are made to emphasise still further the importance of the precautions needed when handling explosives.

Explosives are never safe, not even when handled with care; they must be considered on all occasions to be lethal weapons and should be treated as such, and this attitude of mind must be instilled into the user before he is allowed to carry out any work. Those experienced in the use of explosives carry out what appears to the layman a somewhat involved and laborious drill, but it will be found that this has been evolved with the object of reducing risk to a minimum.

As in many other trades there are differences of opinion in methods of procedure, but the user is strongly advised to adopt those which reduce the risk of danger and the chance of misfires. Mr. Leonard states that it is "advisable to have holes ready drilled before making up the charge." I would go further and say that the preparation of the charge should be the final act before placing it in position. A charge which is primed only requires initiation, and as such, is a potential danger. It is most important, therefore, to see that charges are fitted only when the site is cleared of all men.

Safety fuse is very commonly used, but it has the disadvantage that once it is lighted the ensuing detonation is beyond the control of the user. Detonation can be under absolute control if the shot-firing system is used. This method entails the use of an electric detonator, shot-firing cable and an exploder machine. The detonation does not take place until the operator depresses the exploder key and all precautions can be taken before this takes place.

If it is decided to use safety fuse, it is imperative to know how long the delay period is before detonation takes place. Therefore, it seems more important that the length of the fuse should be governed by a predetermined delay time and not "the depth of the drilling plus 6 in. or so for lighting." It is important that all sentries posted around the danger area to prevent unauthorised approach should know what time the detonation is to take place, this, amongst other things, enabling them to take cover at the appointed time.

Furthermore, it should be remembered that deaf people cannot hear warning whistles. With reference to the latter point, I have in mind

the case of a deaf mute who approached a stranded sea mine on which had been placed a demolition charge initiated by safety fuse. Sentries had been posted on sand dune approaches to the spot but this man wandered down to the beach through a hidden approach. In this case warning shouts and the blowing of whistles were of no avail.

Another point to be remembered is that waterproof safety fuse should be used in preference to ordinary safety fuse which has been treated with grease. Grease melts and has been known to cause a misfire by getting into the fuse or detonator cap.

To reduce the chance of a misfire still further, the length of the safety fuse to be inserted in the detonator can be measured, and if the thumb nail marks the length it gives an additional check that the fuse is right home before it is crimped. Furthermore, if the first 12 in. of fuse is discarded whenever a batch of charges are made up the possibility of using damp fuse is reduced. When the operation is complete the end of the fuse left on the reel should be sealed to protect it from damp.

When fitting a detonator into a cartridge, care should be taken to prevent it from being pulled out again in the process of placing the charge in position. While tying the paper from the cartridge on to the fuse should secure it, as Mr. Leonard suggests, a turn of insulating tape from the fuse to the cartridge will make doubly sure.

While misfires are comparatively few and far between, when they do occur they can be unpleasant. The process of placing a further charge near the misfire in the hope of sympathetic detonation may result in the unexploded cartridges from the first charge being scattered over a wide area and this possibility should be checked.

Should a charge consist of several cartridges of explosive the risk of a misfire is almost negligible if the cartridges are lashed to a length of Instantaneous Detonating Fuse (Cordtex). A further advantage of its use is that the detonator is fitted to the detonating fuse and not into the cartridge of explosives as in the normal manner, hence in wet conditions the detonator can be fitted in a dry place.

Most men like to hear a big bang, not the least amongst them being the workers on the job, but it is very important that they all have their heads well down at the time of the detonation. Bits of flying rock, stone, or clay for that matter, can do great injury.

Regulations control the use of explosives and also the disposal of unwanted batches. If burning is resorted to may I offer a word of warning? Do not introduce fresh explosives into a fire which is already burning otherwise there is the possibility of detonation occurring. If gelatine cartridges show signs of exudation or discoloration of any kind, may I emphasise Mr. Leonard's warning—do not risk using them. In fact, if you have any doubt whatever, do not use the suspected component. Finally, if you handle explosives with bare hands, it is advisable to protect the skin with a barrier cream, otherwise dermatitis may be set up.

Kenneth J. Townley

LONDON, W.C.2

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A Policy for Fires

PROFESSOR SIMON seems to argue from the standpoint that it would be a bad thing for industry if all space heating were carried by electricity. I don't think this has ever been suggested. Electricity is only one means of heating and everyone will not use it though it has outstanding merits for this purpose. As so often happens, diversity is forgotten, not only the diversity between one electric heater and another, but between one gas fire and another, one electric fire and a gas fire, one modern smokeless fuel-burning fire and, I hate to say, one raw coal-burning fire, and so on. It is this which makes me wonder how Professor Simon calculates that the electric heating load at midday in winter is responsible for one-third of the load. I just can't believe it.

B.M./S.R.H.Q. does not get a complete answer. Everyone knows—though the electrical industry are rather too kind to say so—that gas pressures are very low at times of peak in many parts of the country and the gas industry are very worried about it as evinced in their technical press. It seems they do not want the domestic space heating load.

So long as freedom of choice continues people will install electricity, gas, oil and solid fuel space-heating appliances and it is important that the efficiency of the last mentioned should be raised by the use of special grates. It is only to be regretted that efficiency in operation is so much lower than on the test bed where the correct fuel is available.

At the moment we are told that the export of coal is essential to help balance our economy, and I should like to ask Professor Simon whether, if we rule out the use of imported oil, there is any way, other than by the use of electricity in the home, by which we can release good coal for export.

R. E. Gamlen

BRIGHTON

Notes on Wiring
by MEGOHM

Methods of Wiring

Exhibition Showed some recent Trends

AT the exhibition organised by the Central Regional Council of the A.S.E.E. held at the Horticultural Hall a week or so ago I was interested to see on display some old and new ideas for installation work.

The re-introduction of the earthed concentric wiring system is being advocated by the manufacturer of mineral insulated metal sheath cables. I know this system is favoured by many engineers, especially those who years ago were using "Stannos" and the return of the earthed concentric wiring system will be welcomed by them.

Earthed Concentric

The obvious advantages of this system of wiring is the saving in material and to a lesser extent in labour costs. Mineral insulated metal sheath cables and accessories are now available in copper and aluminium sheath for use on low voltage circuits and I am told the manufacturer is recommending this method of wiring in preference to what has been in recent years the more orthodox method of wiring buildings using insulated lead and return conductors. It is, however, necessary to consult the local Supply Authority before planning and finalising details in connection with earthed concentric systems, since direct electrical and metallic connection to the incoming service cables is usually not permitted and the economics of meeting the cost of a transformer may have to be considered in relation to the saving in cost on the wiring installation.

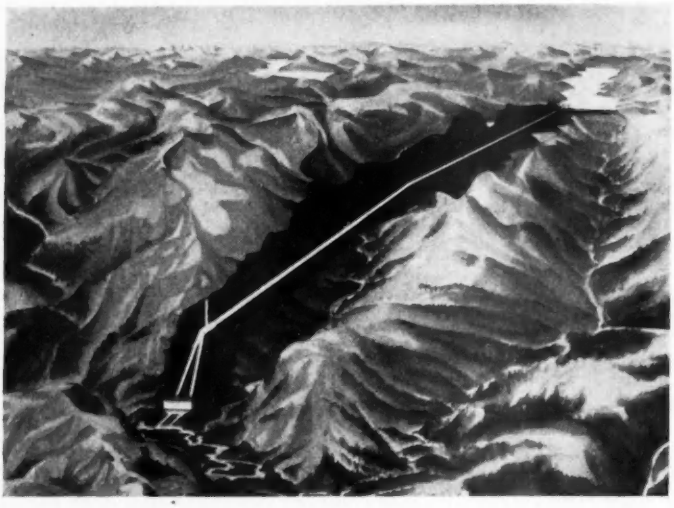
Another interesting and useful unit for house wiring is the introduction of two 5-amp switches mounted in one block and arranged to fit into a B.S.S. 1299 conduit box. The switch assemblies are being made either for box suspension or cover suspension with overlapping coinage bronze or bakelite covers and should be very useful on wiring installations for residential, office and school premises.

Metal skirting ducts and floor ducts of several sections were on display and in view of observations made by "Midlander" in his letter published in the "Electrical Times" on March 29, I made a few enquiries as to the desirability of drilling under-floor metal ducts after cables had been drawn in. My own reaction to this procedure was confirmed that risk of damage to the cables would result, since in general the section of a steel duct is purposely restricted in height to enable it to be covered by a minimum depth of floor screed. In general it is recommended that pre-formed outlets at given centres should be arranged in preference to drilling metal ducts after installation. In answer to "Midlander's" statement that "under-floor systems were not originally designed for serving ceiling points below" this is not quite correct, since a number of large fibre under-floor duct systems have been installed using the ducts for wiring the ceiling points on the floor below, resulting in substantial saving in installation costs and as far as I am aware no trouble from condensation draining into the lighting fittings has been experienced on these installations.

Duct Layout

With reference to planning the duct layout to avoid conduits having to cross the duct system, whilst this is most desirable, in practice it often occurs that last minute changes or additions arise and there are other services to consider, including electrical services where for one reason or another it is desirable to keep the wiring in separate conduits from the duct system, for example the secondary supply system for the lighting of the premises or fire alarm circuits. I agree with "Midlander" that an underfloor duct system is a good way of providing paths for circuit wiring in buildings and should be more extensively used and publicised for the benefit of architects who may for one reason or another prefer to spend large sums on the equipment of a building frontage and entrance halls possibly at the expense of electrical services within the building.

A practical demonstration of making a 132 kV joint on a cable makers' stand attracted my attention and I was also interested in the overhead cable catenary system displayed as I shall soon be visiting sites to see this type of work in progress.



This artist's sketch shows cutaway through mountain through which penstocks connect reservoir and power-house located inside the mountain

The Alcan Project

SOME DETAILS OF THE MAJOR HYDRO-ELECTRIC SCHEME NOW UNDER CONSTRUCTION BY THE ALUMINIUM COMPANY OF CANADA

IN April 1951 the Aluminium Company of Canada, Ltd. (Alcan), started its Nechako-Kitimat project, in northern British Columbia, thus undertaking its largest single expansion. When completed, this development will have created the world's largest aluminium smelter with a capacity of 500,000 tons of aluminium a year. Its powerhouse will have an ultimate capacity of 2,240,000 horse-power, exceeding that of any single generating plant ever built. The entire project will have cost about $550 million, more than any other hydro-electric project ever financed with private capital.

Requirements of Aluminium Production

Low-cost hydro-electric power is at the base of the Canadian aluminium production. About 10 kWh of electricity are required to produce one pound of aluminium. This is the equivalent of 16 tons of coal to produce one ton of the metal. One horse-power produces approximately 700 lb of aluminium per year. To get low-cost power, large volumes of falling water must be found. The water must be harnessed and put to useful service turning the generators whose developed power furnishes the energy required for the production of aluminium at the smelter. It is also essential that the smelter should be located near deep-water shipping facilities, since it takes about seven tons of bauxite and other materials to produce one ton of aluminium, and transportation costs must be kept to a competitive minimum. Bauxite and the other raw materials from which aluminium is processed come from many distant regions of the world and only by ship can they be brought in economically. After extensive surveys in many parts of the world, these features have been found to exist in the Nechako-Kitimat area, in northern British Columbia. Canadian engineering skill and pioneering spirit will combine them to produce ever-increasing quantities of aluminium for Canada as well as for the Commonwealth.

The basic ore of aluminium is bauxite, a reddish-brown clay found in many parts of the Commonwealth. The Canadian market obtains its supplies from British Guiana. There it is mined and transported by boat to Canadian ports. The other main raw materials are cryolite, which comes from Greenland, fluorspar from Newfoundland and petroleum coke from United States.

Bauxite is refined by chemical processes to make alumina (Al_2O_3). The alumina is next reduced to metallic aluminium in reduction furnaces—large steel boxes lined with carbon.

Heavy electric currents passing from carbon anodes, through a bath of molten cryolite in which the alumina is dissolved, to the carbon lining of the steel pot, cause the aluminium metal to separate from the alumina and collect in the bottom of the pot. The metal is then drawn off at established intervals and shipped to manufacturing plants throughout the free world, usually in the form of Alcan's 50-lb ingots.

The site which Alcan has chosen for its project is located some 350 miles north of Vancouver, in the Tweedsmuir Park area. This area lies south of the line between Prince Rupert on the coast and Prince George in the interior.

Hydro Plant

First plans now under way call for a dam on the Nechako River, whose waters, presently wasted, flow eastward. The dam, 310 ft high and 1,350 ft long, will cause the water to back up, raising the elevation of the tributary lakes to the same level. A reservoir will thereby be formed which will stretch 140 miles from the dam to the west end of Tahtsa Lake. There a 10-mile tunnel will be driven through the solid rock and the water will plunge 2,600 ft to the power station located at sea level. Here a huge man-made cavern will be carved out in the base of the granite cliffs of Kemano Bay. This sea-level underground power-house will be the largest of its kind in the world and the generator room alone will be 70 ft wide by 100 ft high by 1,000 ft long.

Each pair of machines in the power-house will have its own generator transformer bank consisting of three single-phase units each rated at 71 MVA. Three of these units will form a 213 MVA, 13·2/301 kV 3-phase bank and will be connected to the generators on the 13·2 kV side by means of double primary windings. At Kitimat the step-down transformers will consist of 37 MVA single-phase units grouped into 3-phase banks of 111 MVA rating at 275/73·2 kV.

The generator transformers are to be housed in cubicles alongside the generators and the egress is by a long underground tunnel. Connection on the h.t. side between the transformers and overhead lines is therefore by aluminium-sheathed cables. These are designed for a maximum working voltage of 301 kV, and apart from a short section of 380 kV cable installed in Sweden, are the highest voltage rated cables in the world.

This view of Kemano Bay shows the wharf, harbour and the valley

Some idea of the arduous working conditions at the site can be seen from the pictures above. At the top is shown the preliminary work on dewatering the canyon. The centre picture shows the site at the dam, looking across the valley westward. In this can be seen the approach roads and quarry hill. At the bottom is a view taken inside the tail race tunnel at Kemano power station showing a shot firing drilling rig, "Jumbo," at the face. The size of this tunnel, which is one of two running from the underground station to Kemano Bay, can be judged from the men working on the platforms of the rig

Transmission

The electricity generated here will be transmitted 48 miles across mountains and glaciers to the smelter at Kitimat. The highest point along the line, Kildala Pass, has an elevation of 5,350 ft. When Alcan first surveyed this barren area very little detail was available on weather and icing conditions, and test transmission towers had to be erected. This was an arduous job. During the 1950-51 winter six young college graduates were flown to remote and desolate spots high in the ice and snow covered mountains. They lived in log cabins and their only contact with the rest of the world was by helicopter. The highest site on the line, the Kildala Pass, is 2,000 ft above the timberline and, because it would be impractical to maintain a permanent crew at such altitude, it was decided to erect test spans that would automatically record weather and icing conditions. To erect the test transmission towers at about 5,300 ft above the sea level, the ice in some places had to be blasted away, so that towers could be lodged directly on the firm foundation below. In other places, the uprights were sunk all the way through the glacier until they met the rock bed. The findings of the "Kildala Pass Operation" have now provided the necessary and valuable data.

As the terrain through which the lines must pass is practically inaccessible by road, all the tower structures will be flown to site by helicopter. It was therefore considered economic to use aluminium instead of steel and an experimental design is now undergoing loading tests. So far this design has proved eminently satisfactory, although full tests have not yet been completed.

Progress at Kitimat

The Kitimat smelter in the ultimate stage of the Nechako-Kitimat development will, when completed, have a final capacity one and a half times that of Alcan's Arvida smelter, now the world's largest. However, at the present only the first stage of the development is under way and it is expected that the first aluminium ingot to be produced at Kitimat will be on the market in 1954.

Kitimat was until recently a very small Indian village. Founded some 300 years ago, it stepped into the industrial era only last year. When in the spring of 1951 the first Alcan craft brought in a load of construction materials, it was found that only one single abandoned Indian cabin would provide reasonable shelter. Today Kitimat-Nechako is a crowded area, where lumbering tractors, heavy machinery, and pioneer men are busily at work. While aero-

planes and helicopters are opening new roads in the sky, men open new roads in the forest and across the mountains.

It is expected that by the summer of 1952 over 7,000 men will be on the job. As soon as all surveys are completed, work will start on the new smelter and town site, where the bulk of the labour force will be needed.

The Kitimat smelter will be supplied with alumina instead of bauxite. Alumina will come from the Commonwealth Caribbean area and will be sent to Kitimat through the Panama Canal. By shipping alumina rather than bauxite, the transportation cost will be halved.

Future Prospects

To provide the expansion of bauxite-alumina facilities already under construction on the island of Jamaica, the Canadian investment in that region will be augmented by at least $20,000,000. The new Jamaica alumina plant, the first in the Caribbean, is now having its planned capacity increased from 180 metric tons of alumina per day to 450 tons per day. First production is expected late in 1952.

During the year 1951 Alcan employed some 16,000 people engaged in primary aluminium production, while more than 50,000 Canadians in 1,000 independent industrial plants were engaged in the manufacturing side of the industry. Approximately 85% of Alcan's aluminium production is exported and the bulk of it goes to U.K. Canadian aluminium is the main source of supply to British manufacturers. Under the contract presently existing between U.K. and Alcan, the Canadian producer shipped during 1951 some 150,000 metric tons of aluminium to U.K. The British government has also placed firm orders for at least 220,000 metric tons in each of the years 1952 and 1953. The shipments of Canadian aluminium to U.K., which have been running at an average annual rate of 150,000 for the past four years, have thus now been considerably augmented.

With the building of Kitimat to answer the ever-increasing demand for metal, aluminium production has taken a great step forward. The Canadian industry is confident of supplying the future needs of the Commonwealth.

COOKING FOR 1,000 EMPLOYEES

CATERING for over one thousand employees, a canteen has recently been built at The Austin Motor Company's South Works, Longbridge, Birmingham. The design utilises the ample process steam available at the works for those applications where steam can be employed, namely for hot-cupboards and water boilers in the service counter, steaming ovens, vegetable boilers, dish-washing sections and Bain Marie. The main electrical cooking equipment, however, is of standard G.E.C. design and consists of two cabinet roasting ovens, a double oven range, boiling table, two pastry ovens, two two-pan fish fryers, and two grillers.

The kitchen is divided into various preparation sections, and separate units are provided for meat, vegetables and fish, as well as for the bakery and dish-washing section, the last-named being subdivided into two further sections, one for the main canteen and the other for the senior staff rooms. The service counter is similarly arranged, one section providing a waitress-served counter for the senior staff, the other providing a serve-yourself counter for the main canteen. In addition to the normal counter service the latter section is provided with a soda fountain. A small laundry has also been provided consisting of a Bendix washing machine and a drying and airing cupboard. The General Electric Company, Ltd., undertook the complete installation, which was carried out under the supervision of Mr. Duncan Brown, chief engineer of the Austin Motor Company.

A general view of cooking facilities in the canteen is shown in the accompanying photograph

Problems and Practice IN ENGINEERING

Coloured-core Cables

THE cores of paper insulated cables were formerly identified by colouring the outer core papers, but now, following BS 480: 1942, the cores are numbered.

Since the natural colour of impregnated paper is brown, the colours are not clear hues; they are dark shades, making it difficult to identify the cores in a poor light. With three-core cables red, white (natural), and blue are easily distinguished, but four-core cable colours are more difficult. The fourth colour, say green, can be confused with blue. These colour schemes mentioned here may not be in accordance with BS 7: 1926 or later specifications.

Parti-coloured cores of red/white helices, like a barber's pole, are effectively identified by their colours; such cores are sometimes seen in four-core cables where better differentiation than can be had with all plain cores was required.

Experience shows, however, that in spite of the difficulties cable jointers rarely make mistakes in identification—even when the colours are stained black by bituminous compound from a previously made joint. Their usual method of identification is to tear off an outer paper and, by holding it up to the light, to view the colour in transparency.

With h.v. cables it is common practice to joint them "colours as they come" to avoid crossed joints; in this case the core identification is not important, since the phasing-out is invariably the result of a test, and not dependent on colour discrimination. But in the case of l.v. cables on underground systems, where live jointing is practised, the identification by coloured or number papers is essential.

It is not always desirable on large-section l.v. cables to joint "colour to colour" because crossed straight joints on, for example, 0·5 sq in. four-core are not easy. If it is known, or suspected, that joints on such cables are not colour to colour, phasing-out is necessary.

When repairing l.v. cables after a fault, the jointer's task is made doubly difficult by the blackening of the core papers with compound and soot, i.e. carbon deposit from the burnt compound. Bearing in mind that the jointer is working hastily, mistakes are possible, so that it is advisable to check phasing-out.

On the whole, identification by colour has worked very well, but most engineers have welcomed the change to numbers. One of the old ideas, the passing of which is regretted, is a second method of identification by one, two or three tinned wires among the plain wires; a method which does not fail when the core papers are burnt.—*J.G.B.*

Conduit as an Earth

IN many cases a run of conduit has too high a resistance to make an efficient earth. This is especially the case with power circuits, the conduit joint to a motor carcase as made has a high electrical resistance. This can be increased if any bushes used are not tight, and if the conduit is screwed in direct the threads may be sufficiently loose to permit rusting and tarnishing. Screwed connections in conduit, if to be part of an earthing system, should be painted on the outside to prevent the entry of dampness. Also conduit is likely to waste and rust. If conduit is used for earthing, first its resistance should be tested with a low voltage supply, and such tests should be carried out at regular intervals. Conduit makes a good earthing medium, but only if it has, and is maintained at, a low resistance.—*W.E.W.*

From time to time we select from the queries that reach us, one that readers generally may care to try to answer. A selection of their solutions to the problem below will be printed on this page, and paid for at our usual rates.

Unwanted Speed Change

I HAVE in my care a 5 h.p. d.c. shunt interpole motor, 500 V, 500 r.p.m., equipped with only two brush spindles, each holding two brushes. This motor was installed as a spare to drive a machine, and on being used for the first time it ran normally for two or three days. Then I received a report to the effect that output was slowing down considerably. I decided to take the speed of the motor and found that it was running about 50 r.p.m. below normal. The motor and its control gear appeared normal on examination, but I connected a field regulator in circuit to bring the speed up to 500 r.p.m. All went well for a day, after which the operator reported that it had been necessary to bring the regulator back to the "resistance full out" position. This fluctuation occurred three times in a fortnight. Can you help me to clear up the cause of this?—*D.R.*

Oil under Water

Diesel-Electric Drive chosen for Drilling Barge

AN unusual example of the advantages of flexibility that direct-electric drives can often offer over steam power is provided by a self-contained lake craft now being constructed in this country for the Shell Petroleum Co., Ltd. The duty of this box-like vessel will be to provide power for drilling operations in the oilfield under Lake Maracaibo, Venezuela. Used in conjunction with a drilling platform sunk onto the bed of the lake, this self-contained barge will be capable of drilling to depths of 15,000 ft in the deepest waters of the lake, some 15 miles from the shore.

Overall dimensions of the barge are 158 ft by 8 ft, and she has a designed draft of 7 ft 6 in., giving a displacement of 2,545 tons. The main power plant consists of four 12-cylinder pressure-charged 4-stroke diesels, 698 h.p. continuous rating, which operate at 650 r.p.m. and drive 450 kW d.c. generators. In addition, there are two auxiliary generating sets, which consist of a 150 kW a.c. and a 20 kW d.c. generator connected in tandem and driven by 7-cylinder vertical diesels with a rating of 281 b.h.p.

Power Limits

For the main d.c. power units, variable voltage generation is adopted, the limits being 450 V at full load, 520 V at no load. Each generator is of two-field design, with a shunt-field separately excited from the pony-mounted amplidyne exciter, and a differential series field. This combination gives the drooping characteristic required for control flexibility, and also some protection against overloading.

The two auxiliary generating sets supply alternating current at 440 V, 3-phase, 60 c/s to various auxiliaries, while the tandem mounted d.c. generator supplies field excitation current at 250 V. Although one of these auxiliary sets is intended to serve as a standby, provision is made for the paralleling and sychronising of both sets should additional power be required. Transformers are provided to step down the a.c. supply to 110 V for lighting purposes and to provide a reference voltage for the amplidyne exciters.

Installed below the main deck of the power barge are four d.c. motors. Two of these are 800 h.p. units with a speed variation from 720 to 72 r.p.m. They are each connected through a 2 in. pitch quadruple chain to drive the two main mud pumps used during drilling operations. On the port side of the pumps is a 300 h.p., 750-75 r.p.m. motor coupled to a multi-cylinder pump used for cementing operations in connection with building drilling platforms, and on the starboard a 150 h.p., 900-90 r.p.m. motor driving through a V-belt an auxiliary mud pump. Speed variation is secured by control of generator voltage.

Drilling Platforms

Further 800 h.p. and 300 h.p. motors will be installed on the drilling platform when this is in position on the lake bed. These motors are forced-ventilated by individual electric-motor driven blowers to ensure full ventilation regardless of speed, and also as a safety precaution when gaseous conditions are encountered. A supply is taken from the power barge to the drilling platform through a flexible cable, and two-way remote control of machinery on the barge and on the platform is provided.

This drilling pattern comprises a prefabricated structure having four corner groups of three 20-in. diameter steel caissons of suitable length to meet the depth of water at the proposed location. The structure is prefabricated on shore, transported by a crane barge to the desired site, and placed bodily into position on the lake bed. 13 in. diameter steel piles are then driven through the caissons to refusal, and concrete is placed around them, to form a solid structure that should last adequately for the expected life of the well. Finally, on top of this piled substructure a steel platform is erected to accommodate the 136 ft. high, 30 ft. base drilling derrick, draw works and rotary table, with the motors described above.

Selection of diesel-electric machinery in preference to steam was made in spite of a higher initial capital cost being involved. Chief amongst the many advantages which were considered in arriving at this choice was avoidance of the feedwater problem which is so troublesome in marine applications. Further, although more skilled supervisory and maintenance personnel will be required, with higher daily operating costs a direct result, it is expected that on a long-term basis this will be offset to an appreciable extent by savings in fuel consumption, plant maintenance. Another advantage is the reduction of fire hazard with electric power. The barge is being built by Messrs. Ferguson Bros. (Port-Glasgow), Ltd.

The R.E.C.M.F. Exhibition

IMPORTANCE OF COMPONENTS IN THE EXPORT FIELD

OVER one hundred exhibitors took part in the annual British Radio Component Show held last week at Grosvenor House. The importance of this industry may be gauged from the fact that the value of loose components exported is now approaching an annual rate of £10 million of which 10% goes to Canada and the U.S.A. Below, we give a brief description of some of the items shown in this interesting exhibition.

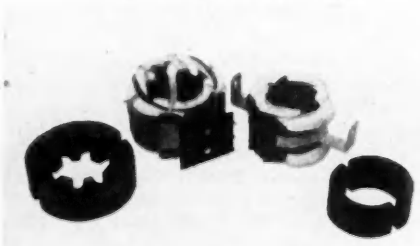
Wires, Cables and Insulation

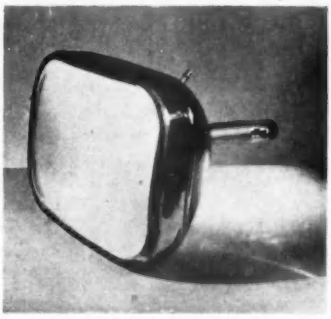
A new grade of P.V.C. compound known as "VO" was shown in the form of sleeving by Associated Technical Manufacturers, Ltd. This can be used at temperatures up to 150° C and maintains its flexibility. Heat resistance sleeving was also exhibited by H. D. Symonds and Co., Ltd., whose yellow varnished Terylene also withstands an operating temperature of 150° C.

In the wire and cable field B.I. Callender's Cables were showing a 37-contact moulded-on polypole coupler for 3-twin or coaxial and 30 other circuits. This had been designed for T.V. camera use. Enamelled winding wires included one which weighed only one ounce for a length of over 3½ miles. Other winding wires included the BICALOC series which have an outer covering of thermoplastic material. When heated and allowed to cool after winding, the adjacent turns are firmly bonded together.

Ceramic insulators were shown by Geo. Bray and Co., laminated plastics by Thomas De La Rue and Co., and a new form of Micanite by Micanite and Insulators Co. Ltd. This last item known as "High Heat" is a built-up mica using an inorganic bond and is self-supporting at temperatures up to 500° C.

Narrow angle and wide angle scan coils and Caslam cores for TV by Plessey





Ferranti's square-end c.r.t.

A range of products specially suited to the radio and electronics industries was shown by the London Electric Wire Co. and Smiths, Ltd. These included enamelled wires, Lewmex (synthetic enamel), silk covered, Lewmex bond (self-bonding Lewmex), Litz strands, Glazite connecting wire, aerial wire and earth rods. Resistance wires and tapes in Eureka, and Vacrom, molybdenum rods wires, and tapes, and special wires were of interest on the Vactite Wire Co.'s stand.

Capacitors and Resistors

Apart from valves, the most important components in radio are resistors and capacitors. The trend toward miniaturisation was well exemplified by the range of electrolytic capacitors shown by Daly (Condensers), Ltd., of which a 32 mfd, 350 V unit measures ¾ in. dia. by 2¼ in. long. T.M.C. were also showing a selection of space-saving metallised paper tubular capacitors, and precision high stability silvered mica capacitors. Plessey had their new "S" type miniature variable capacitor for manufacturers' use and in the precision field for communications and scientific equipment Mullard were exhibiting a high precision variable capacitor. Though small in size this has excellent long-term stability and re-setting accuracy.

Elcohm miniature wire-wound resistors both vitreous and lacquered in finish were being featured by Electronic Components. Of extraordinary smallness was the 3 Megohm logarithmic low potentiometer made by Egen for incorporation in deaf aids.

British Electric Resistance Co., Ltd., have

Tannoy's latest microphone is no bigger than a half crown

developed a new protective coating for wire-wound resistors which will withstand temperatures up to 400° C yet does not need the high-firing temperatures required with vitreous enamel. Government-type "approved" potentiometers and fired resistors were of interest on Morganite Resistors' stand.

Materials and Transformers

Magnetic materials were shown by many firms. Mullard, for example, included displays of "Ticonal" cast magnets suitable for loud-speakers, microphones, pick-ups, cycle dynamos, instruments, and so on. Special shapes can be obtained by sintering.

Ferroxdure magnets also by Mullard are particularly suitable for use where severe demagnetising fields may be encountered. For transformers and chokes the English Electric's "C"-type cores wound from continuous strips of cold-rolled, grain-oriented steel are particularly suitable.

"Superspeed" activated rosin-cored solder wire in various alloys and gauges and in several colours for coding purposes was of interest on the stand of H. J. Enthoven and Sons, Ltd. Some 400 different types of solders and fluxes were shown by Ersin Multicore, Ltd.

Ferranti, Ltd., were showing a range of transformers, some using the "C"-type core, for use in service equipment, whilst Parmeko, Ltd., made a feature of their "Saturn" range of transductors. Special magnetic material suitable for transductors was of interest on the Standard Telephones and Cables' stand.

Record Reproducing Equipment

Birmingham Sound Reproducers, Ltd., showed a new three-speed record changer, which will play 7-in., 10-in. and 12-in. records mixed. Collaro, Ltd., also introduce some new record changers, incorporating a new method of record dropping, and a high fidelity magnetic pick-up, the Orthodynamic. This is suitable for 78 r.p.m. and long-playing records, and has a twin-point stylus of special alloy, said to be more durable than sapphire.

The Garrard Engineering and Manufacturing Co., Ltd., have concentrated this year on minor modifications of their existing range to improve efficiency in the light of experience gained with three-speed units.

Erwin Scharf had a wide range of new pick-ups, including a magnetic turn-over type, with automatic weight adjustment (Model 165).

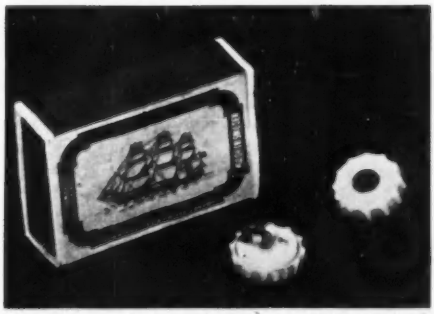
Television Components and Valves

A comprehensive range of television components was on view at the Plessey stand, and of considerable interest was the permeability tuned Gang Multi-station Tuner, which permits the manufacture of a single television model to cover all five B.B.C. frequencies, and is the first unit tuner for the British stations to be made commercially available.

Painton and Co., Ltd., were exhibiting, amongst a range of faders, switches and terminals, a special TV/radar plug and socket which incorporates two Post Office-type co-axial connectors and twelve ordinary plug-and-socket contacts. This composite design enables complete supplies of vision, power, etc., to be brought to panels or chassis.

Among the valves and electron tubes on view, were Mullard radar display tubes with exceptionally high resolution, a rare gas rectifier for use at high altitudes and a small power tetrode for operating in the v.h.f. range. English Electric were showing the image orthicon camera tube as used in T.V. cameras and also had their 16-in. metal receiver tube with its almost flat glass face-plate.

Rectangular tubes were also being exhibited



Egen Electric Ltd. produce these miniature deaf-aid potentiometers

by Ferranti, Ltd., who in addition included many specialised valves such as stroboscopic lamps, stabilisers, cold cathode trigger tubes, electrometer valves and various types of rectifiers. From G.E.C. came a prototype aluminised circular tube with a 16-in. flat screen. Additions to the range of miniature G.E.C. receiving valves were the LN309, a triode-pentode with separate cathodes; N339, a line time-base output pentode; U319, a half-wave rectifier capable of supplying 170 mA, and U329, a booster diode with a heater-to-cathode insulation capable of withstanding a peak-voltage of 7·5 kV.

Metal rectifiers of copper oxide, selenium and germanium for all applications were shown by Westinghouse Brake and Signal Co., Ltd. Germanium diodes were also shown in a demonstration by G.E.C. This indicated the superior rectification efficiency of the GEX35 germanium diode over a thermionic diode in a television receiver.

Bulgin were of course well to the forefront in the component field with an impressive range of products. New items included signal lamps with multi-view and colour-changing facilities. Temperature-sensitive cut-outs are being made to assist compliance with the revision of B.S. 415 proposals. A new range of rotary switches with ceramic insulation were shown by A. B. Metal Products, Ltd. "Diamond H" Switches also had several new models. The protective field was catered for by Belling and Lee, Ltd., who have developed miniature thermal delay switches for the protection of T.V. and electronic circuits.

Opening Speech

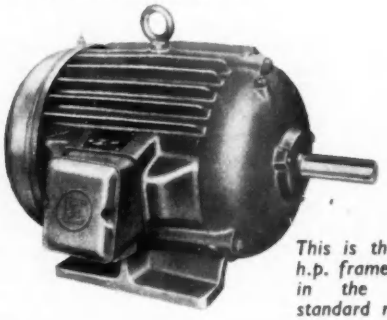
In his opening speech, Sir Robert Renwick referred to the growing demands of electronics on the components industry. This was now producing over twelve million components a week. Overseas demands continued to grow at an impressive rate. In 1950 they were valued at £8 million; in 1951 this had risen to over £11 million, and for the beginning of this year the rate was at £14 million. During the past six years 100,000 manufacturers, engineers and overseas buyers had visited the exhibition. There was every indication that the attendance this year would eclipse all previous records.

Standardised Motor Dimensions

INDUCTION motors standardised as to frame size, rating and shaft dimensions were shown last week to technical Press and trade visitors at an exhibition staged in London by the English Electric Co. They are believed to comprise the first range of motors complying with a draft British Standard which covers totally enclosed, fan cooled s.c. induction motors from 1 to 20 h.p.

Dimensions specified in this draft standard follow American standard practice, but for a given frame size have a higher horse-power rating, and correspondingly larger shaft dimensions. The American frame size 225, for instance, covers a 5 h.p. motor at 3,600 r.p.m., while the corresponding 3,000 r.p.m. motor in the new British range has 7½ h.p. standard output.

Details of this new English Electric "LY" range which have been released show that a change has been made to metric bearings for the rotor. Pressure die-cast construction is employed for the rotor which has aluminium alloy bars and end rings, with integrally cast fan blades. The stator is wound with synthetic resin covered copper, with backed heavy press-board slot liners. The wound assembly is impregnated to tropical standards before being pressed and keyed into the cast iron stator frame which has integral feet.



This is the 7½ h.p. frame size in the new standard range

Stock motors are sent out with the terminal box on the right hand side of the motor when looked at from the non-driving end, with the cable entry pointing vertically downwards. Facilities are provided to give three other positions of cable entry, spaced 90° apart, while if the terminal box is required on the left hand side of the machine, this may be arranged by reversing the stator.

CANADIAN WATER POWER

Survey of Present Available Resources Published

THE water powers of Canada, although only partly exploited, have exercised a marked influence on the economic development of the country throughout the present century. During this time there has been a gradual change from an economy based largely on agriculture to one increasingly dependent on industrial operations. The close relationship between water power and industry is particularly evident in Quebec and Ontario which, although lacking in indigenous coal, have become the more highly industrialised regions of the country through the use of their water power resources. Also, in recent years the Province of British Columbia, which is rich in potential water power, has been making rapid industrial progress.

Annual Report

A report on the state of water power in Canada is issued annually by the Department of Resources and Development at Ottawa. Estimates of water power are carried out following hydrometric investigation by the Water Resources of the Division, and these estimates arerevised from time to time as more lengthily precise stream-flow records are accumulated and more data become available on potential power sites.

AVAILABLE AND DEVELOPED WATER POWER IN CANADA AT END OF THE YEAR, 1951

Province or territory	Available 24-hour power at 80% efficiency—h.p.		H.P. installed capacity
	Atordinary min. flow	Atordinary 6-month flow	
British Columbia	7,023,000	10,998,000	1,358,808
Yukon & N.W.T.	382,500	814,000	28,450
Alberta	508,000	1,258,000	207,825
Saskatchewan ...	550,000	1,120,000	111,835
Manitoba ...	3,333,000	5,562,000	596,400
Ontario	5,407,000	7,261,000	3,718,505
Quebec	10,898,000	20,219,000	6,755,351
New Brunswick	123,000	334,000	132,911
Nova Scotia ...	25,500	156,000	150,960
Prince Edward Is.	500	3,000	2,299
Newfoundland ...	1,135,000	2,585,000	279,160
Canada	29,385,500	50,310,000	13,342,504

The accompanying table gives a survey of the water power resources of the various Provinces. In comparing these figures, it should be noted that because excess capacity is usually installed at developed sites, the figures in the last column are not directly comparable with those in the previous one. If a comparison should be required, the figures of the available power at ordinary six months flow should be increased by about 30%. The total installed capacity then represents slightly more than 20% of the maximum available power.

Potentialities

Although extensive use of Canada's water-power resources is being made at the present time, large reserves of potential power are still available. It is true that a large number of the more attractive sites within economic transmission distance of present centres of population already have been developed. However, remaining reserves of not-too-distant power are sufficient in most instances to meet the prospective needs of the more closely settled areas for some years at the very least; also, improvements in the technique of long-distance transmission probably will bring additional sites within the orbit of existing systems. In more remote districts, available water power will facilitate the utilisation of mineral and other resources and lead to the establishment of new communities; from the viewpoint of moving Canada's frontiers northward, the fact that much potential power lies in the more northern and at present rather inaccessible regions of the country is definitely advantageous.

Progress in 1951

Keeping pace with the expansion of general industrial activity throughout Canada and the consequent increasing demand for electric power, construction of power plants proceeded vigorously in 1951. Following the usual trend of power development in Canada, the larger part of this construction was concerned with water-power plants, although the building of thermal plants also was active. A total of 881,250 h.p. of new hydro-electric capacity was brought into operation, about 1,700,000 h.p. is under active construction for operation in 1952-53 and approximately the same amount is in the preliminary stages of construction with operation planned for 1954-55. One striking feature of the present programme of development is the number of new projects which are being undertaken in rather remote regions, with the power to be used locally; this draws attention to the potential value of those undeveloped sites which at present may appear to be so remotely located as to be of little economic importance.

Electrocuting Whales

Pirelli-General and G.E.C. Supply Control Gear and Cables for New System

BOTH from an economic and a humane viewpoint it is desirable that the death of a whale after harpooning should be quick and unaccompanied by violent muscular effort of long duration. The question of the electrocution of whales has therefore occupied the minds of whalecatchers for some years; in fact the first patent for this type of equipment was granted as far back as 1868.

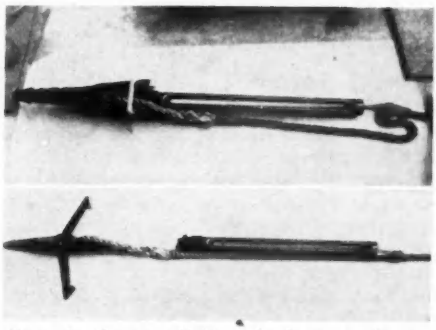
Modern Experiments

There then followed two Norwegian experiments, but the first promise of some success came in 1929, when Dr. Webber, a German engineer, succeeded in electrocuting four fin whales off the Norwegian coast. Further experiments, including the reported electrocution of 250 whales in 1932/33 by the Sir James Clarke Ross Fleet, were carried out in co-operation with Dr. Webber until 1945, when he destroyed all his papers on committing suicide.

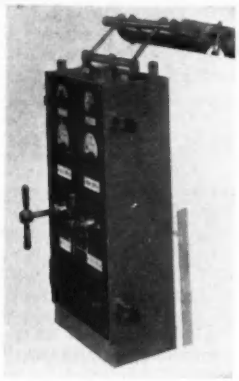
Experiments have been carried out in the past few years by United Whalers, Ltd., in conjunction with Pirelli-General, G.E.C., the Konsberg Gun Co., and Elektrohval of Norway, and Westley Richards of Birmingham.

Although basically simple in concept, considerable research and development was found necessary before the equipment became satisfactory. The principle of the method is to fire a harpoon into the whale, and pass a current through a conductor in the rope which electrocutes the whale, the circuit being completed via the sea. The principal difficulties are to provide a rope construction which is light, flexible, and will carry a conductor without fracture; the second to insulate the harpoon where it enters the whale so that short circuits are avoided, and the third to design the equipment so that it can stand up to the severe Antarctic weather.

The master control panel built by G.E.C. was housed in a miniature marine enclosure



Above is the new lightweight harpoon showing how the shank and head can be separated to avoid short circuits. Below, left, is a view of the spigot gun and on the right the harpoon can be seen striking a whale



This is the G.E.C. control panel which is housed in a miniature marine enclosure on the bridge for operation by the helmsman if necessary

and mounted on the bridge for convenient operation by the helmsman or any other appointed person. The necessary voltage was provided by a 250 V single-phase alternator. Pirelli-General and British Ropes combined to solve the problem of designing a flexible electrical conductor which could be embodied within a nylon three-cordal rope—which can contract or expand by 40 to 45% depending on the pull. In Norway, a new type of harpoon was developed which enabled the shaft to be detached from the head when the whale was struck, thus removing the possibility of short circuits, and finally in order to avoid sinking the whale, a spigot gun was designed by Westley Richards to fire a very light weight harpoon. This latter led to a rope and conductor redesigned to cope with the higher operational velocity of the gun.

Further Work Required

Armed with the new equipment, which had been based on the experiences of 1948-49, a second experimental expedition left in 1949-50. Although in many ways successful, more work was still required. The mechanical stresses on the equipment came under survey. The Westley Richards gun was redesigned and a new rope and cable system was produced using a manila forerunner.

Instead of waiting for the forthcoming Antarctic season in order to test the modifications, the Directors of United Whalers Ltd., arranged for a trial expedition to the little island of Sao Thome on the equator off the African coast. A whale of the Sei species, weighing 50 tons, was quickly killed, and, after various tests in which the mammal sank to approximately 300 ft, it was safely retrieved and hauled in on a new type of forerunner which the Pirelli-General Cable Works had produced on a new principle with a tensile strength of a little more than half that normally used.

It can therefore be seen that preliminary tests with this new gear have been most encouraging, and it can now be said that the whale can be killed without undue pain, and with considerable savings both in time and material.

Cable Drum Manipulation

AT first sight, a cable drum appears to be an easy item to transport and manipulate. Fashioned as it is in the form of two discs with a connecting cylinder it rolls easily; too easily in fact, for when it is loaded with a few tons of metal and insulation, control becomes difficult. It takes several sturdy men to get it started, to prevent it running away once it is rolling, and to turn it round corners without it toppling over.

At a cable works, therefore, the handling of drums can be wasteful of both time and labour. At Crompton Parkinson's works, for example, five men were needed to push around four tons of loaded drum. To overcome this waste of manpower an I.T.D. "Electricar" industrial truck towing a special drum carrier designed and supplied by I.T.D. has been introduced.

The "Electricar" is a type TLR6 one-ton load capacity, elevating platform industrial truck, powered by a "Young" armoured traction battery. As can be seen from the photograph, the cable drum carrier is designed to accommodate different sizes of drum.

Now instead of five men, one lad can efficiently handle drums of all types and sizes as is shown in the photograph below.

The "Electricar" cable drum carrier

overseas news

No Hold-Up

Refuting allegations of slow progress in the work of constructing the new Lake Macquarie power station, New South Wales (as we reported on April 3), Mr. W. F. Sheahan, Minister for Transport, has said that work has been speeded up and it was now expected that the first two 50 MW sets would be in operation in the winter of 1954, provided steel continued to arrive from Britain. (Originally it was planned to have the first two sets running by the winter of 1953.) Mr. Sheahan pointed out that heavy rain prevented earlier site work, and a shortage of steel in 1950 further hindered matters so that the original schedule had to be amended early in 1951. Although 3,000 tons of steel had been received, a further 5,500 tons was still needed from Britain, he pointed out.

Changes

Plans to augment supplies to Launceston were outlined by the Hydro-Electric Commissioner of Tasmania recently. He said the power system was being altered so that the main lines to Launceston would operate at 110 kV instead of the existing 88 kV. The h.t. feeder voltage, except in the centre of the city, would also be raised from 6·6 kV to 22 kV.

Quebec Scheme

One of Quebec's St. Lawrence north shore rivers—the Bersimis—will be harnessed to supply electric power to Gaspe Peninsula's mining development. Disclosing this recently, Premier Duplessis said that the Quebec Government has leased the 1,000,000 h.p. potential of the 175-mile river, which flows into the St. Lawrence roughly 40 miles west of Baie Comeau, to the Quebec Hydro-Electric Commission.

Economies

Substantial economies effected in the construction of Canada's largest steam-driven generating station, the Richard L. Hearn, of the Hydro-Electric Power Commission of Ontario, had resulted in a saving of $7,000,000, Mr. R. H. Saunders, chairman of the Commission, stated recently. He said the saving was made possible by simplified station design and equipment purchases from the U.K. at favourable exchange rates. Total expenditure on the station to date is $31,500,000. Two generating sets are in service, two more are scheduled for operation early in 1953, and a further two are projected.

Rural Work

Present plans of the Manitoba Power Commission call for the electrification of all 42,000 farms in the Province within three years, Hon. Ron Turner, acting minister of public utilities, announced in the Legislature recently. To date 27,000 farms had been provided with electricity from this agency, he said, and during the next two fiscal years, the commission plans to extend its lines to include 10,000 farms in new areas. In addition, 5,000 other farms in areas already serviced will be included in the expansion programme. By the end of the fiscal year ended March 31, 4,278 new farms had been added to the electrification list.

Manufacture Decentralisation

A reorganisation of the internal structure of the Canadian General Electric Co., designed to further interest in the job on the one hand among all the 14,000 employees, and provide increasingly efficient product services on the other, has been announced by Mr. H. M. Turner, president. In this decentralisation plan there are now four vice-presidents in charge of staff divisions, and five manufacturing divisions each with general managers. Four of these last divisions are responsible for their own policy and results and each have engineering, production, marketing, accounting and other necessary functions, and will also make their own financial statements. The Wholesale Division, too, is a self-sustaining unit.

Seaway Agreement

President Truman agreed last week-end to the Canadian proposal that Canada should proceed with the construction of an all-Canadian St. Lawrence Seaway. According to the report, this decision has been taken in view of the improbability of agreement by the U.S. Congress in the near future to the proposed joint U.S.-Canadian project. The matter was discussed in Washington, when those present included Mr. Pearson, Minister of External Affairs, Mr. Chevrier, Canadian Transport Minister, and Mr. Acheson, Secretary of State.

Extending Electrification

An agreement is shortly to be entered into providing for the electrification of a number of main railway lines between the Rhine and the Ruhr, we understand. The principal line to be electrified, of about 300 kilometres in length, connects Hamm, Dortmund, Essen/Gelsenkirchen, Duisburg, Dusseldorf, Cologne, and Remagen. It will cost about 150 million DM. Electrification of three other lines is planned, namely, (a) Hamm-Wuppertal-Cologne; (b) Hagen-Siegen; and (c) Oberhausen-Duisburg-Wedan-Deutz-Linz. Test locomotives were ordered some time ago by the Deutsche Bundesbahn, for delivery this summer, and

experimental runs will take place on the electrified region in South Germany.

Hirakud Development

Resulting from discussions between the Government of India and the Government of Orissa, it has been decided to set up a Hirakud Control Board and a Hirakud Development Board to ensure the efficient, economical and early execution of the Hirakud dam project. The Control Board is to have overall charge of the project, including its technical and financial aspects, under the general supervision of the Government of India. The chairman of the Control Board is the chief minister of Orissa, and its other members include the chief engineer of the project.

Addition to 5-year Plan

The Federation of Electricity Undertakings in India has already drawn attention to the fact that in the draft Five Year Plan there is no reference to the planned expansion of privately owned electricity supply undertakings. The Federation has now submitted to the Planning Commission data indicating the expansion the companies have in view during the next five years. This shows that in Assam and Bengal, 163,770 kW of plant will be added, in Bombay Province 66,166 kW, in Bihar and Orissa 9,429 kW, in Madhya Pradesh 7,200 kW, in Madras 534 kW, and in Uttar Pradesh and Delhi a further 20,264 kW of generating capacity will be installed by private companies during the period.

Madras Plan

The supplemental plan for the development of irrigation and power in the State submitted by the Madras Government to the Planning Commission makes provision for the Tungabhadra High-Level Channel and the first stage of the Ramapadasagar and Krishna-Pennar Projects, in addition to eight other irrigation projects and three power projects. This information was given in the Legislative Council recently. Other projects included in the plan are the Perigar hydro-electric scheme (cost Rs. 104·8 m), and the Kundah water power scheme (cost Rs. 230 m.).

East Pakistan Project

Schemes now under construction, will add a total of 68,000 kW capacity in East Pakistan. Of this 23,000 kW is reserved for Chittagong, 36,000 kW for Dacca and Narayanganj and 7,000 kW for the Khulna area. Some of these schemes have been instituted by the Central Government and some by the Provincial Government. But all of them are being executed by the Provincial Government's Electrical Engineering Organization and will cost about Rs. 6 crores. The financial requirements for the execution of the schemes have been provided by the Central Government in the form of a loan. So far as the development of the hydro-electric resources of the Karnafuli River is concerned, preliminary work is already in progress. This scheme will involve an additional expenditure of some Rs. 25 crores. The Central Government will make arrangements to provide the money required.

Co-operation?

The Electricity Supply Commission of Southern Rhodesia has asked the Salisbury city council for certain information to enable it to assess the economic possibilities of future co-operation between the Commission and the Council. The Public Works Committee of the Council has recommended that the latter should supply surplus electricity to the Commission subject to certain conditions, if a surplus becomes available. There is apparently a suggestion that the Council should install additional plant in order to supply the Commission.

Warning

Householders in Cape Town are faced with the prospect of power cuts possibly for the next five years, according to Major A. Z. Berman, chairman of the City Council Electricity and Waterworks Committee. The demand for electricity was increasing so rapidly that soon there would be insufficient generating plant to meet the load, especially at peak hours in winter. He pointed out that new power stations at Salt River and Worcester were both behind schedule because of the world demand for generating plant, and the fifth turbo-alternator which should have been in commission two years ago to complete the Table Bay power station had not yet been delivered, he added.

Fuel Shortage

Shortage of coal has seriously threatened the Pretoria electricity supply undertaking. Earlier this month, Mr. D. J. Hugo, the city electrical engineer, in referring to the undertaking's hand-to-mouth existence, said that the only coal available was already distributed in the station's boiler hoppers. Since then another 1,000 tons has been delivered, but as the station uses about 900 tons daily he has asked the general manager of railways, in Johannesburg, to expedite other deliveries.

Electrification Advocated

In recent discussion in the local Press, Mr. F. W. Aickin, who recently retired from the position of general manager of railways in New Zealand, has stated that: "When all the direct advantages and disadvantages under electrification are taken into account, the accumulated savings will equal the cost of electrification in nine years, after paying interest and depreciation. An alternating current scheme of electrification for the Main Trunk Line, as recommended, will confer many benefits in addition to those already referred to, and apart from the amenities of comfort, cleanliness, and speed." He estimates that the main Trunk can be electrified with an expenditure of sterling which by March 31, 1962 (if the scheme has gone forward according to schedule), will be £650,000 less than the sterling expenditure required to continue steam operation.

PERSONALITIES

IN THE INDUSTRY

Due to arrive in this country tomorrow, April 18, are **Mr. J. C. Fraser,** M.I.E.E., general manager and chief engineer of the Johannesburg Electricity Department, **Mr. G. B. Gordon,** chairman of the City Council Finance Committee, and **Dr. L. Q. Holmes,** city treasurer. This deputation from Johannesburg is to have discussions on the financial and technical details of the contracts for plant for the city council's new Kelvin power station, for which Merz and McLellan are the consulting engineers. The first section of this station, estimated to cost £7 million, is planned to be operating by the winter of 1957, with the second stage for completion by 1961, and the question of getting priority for orders for the plant is one purpose of the deputation's visit. Mr. Fraser was in this country last November on a somewhat similar mission, it will be recalled.

At present shift charge engineer at Agecroft generating station, North Western Division of the B.E.A., **Mr. E. V. Ashworth,** A.M.I.E.E., has been chosen to fill the position of deputy station superintendent at Upper Boat power station, in the South Wales Division. It is expected that he will take up his new duties as from June 1.

Elliott Brothers (London), Ltd., announce that **Mr. J. F. Coales** has resigned his position as research director of the company.

The new president of the Electrical Wholesalers Federation is **Mr. W. H. Swain,** a director of the Manchester firm of electrical wholesalers, Hirst, Ibbetson and Taylor, Ltd. He was elected president at the council meeting subsequent to the annual general meeting of the E.W.F. Mr. Swain has the longest record of service on the council of the Federation, having been a member since 1937. He was previously president in 1945. At the same meeting, **Mr. E. A. V. Peckham,** managing director of G. S. Peckham and Co., Ltd., the London electrical wholesalers, was elected vice-president for the year. He has served on the council since 1949.

Mr. W. H. Swain

Mr. E. A. V. Peckham

His many friends in this country will be interested to hear that **Mr. L. E. Tarr,** A.I.Mech.E., Assoc.I.E.E., has resigned from the position of assistant general manager of the Trinidad and Tobago Electricity Commission which he has held since 1948, having accepted a directorship of the old-established British Engineering Manufacturers' Alliance, Ltd., with head office in Port-of-Spain, Trinidad. This concern, together with its associated company, Masons, Ltd., carry on an extensive mechanical and electrical business throughout the Caribbean area, also in Venezuela and British Guiana. He expects to become active in this new sphere about July next, he informs us.

Mr. L. E. Tarr

As the control of Henry Meadows, Ltd., has now been acquired by Associated British Engineering, Ltd., **Major General W. S. Tope,** C.B., C.B.E., has relinquished the chairmanship of Henry Meadows, Ltd., and **Mr. Alan P. Good** has become chairman in his place. Major General Tope is taking up other important duties in the Brush Aboe Group, we learn.

Mr. Rex Bate, Loughborough sales director of the Brush Electrical Engineering Co., Ltd., is transferring his headquarters to the Brush Aboe Group's offices at Duke's Court, London S.W.1, to concentrate on customer-contact selling both at home and abroad. Home branch office managers and sales specialists—the latter continuing at Loughborough—will still be responsible to him.

Five new appointments in its Engineering Division are announced by the B.B.C. **Mr. H. W. Baker,** A.M.I.E.E., becomes superintendent engineer television studios; **Mr. T. H. Bridgewater,** M.I.E.E., is now superintendent engineer television outside broadcasts; **Mr. H. Walker,** O.B.E. A.M.I.E.E., becomes head of technical operations, television service; **Mr. M. H. Hall** is now designated engineer-in-charge, t.v. studios, and finally, **Mr. W. D. Richardson** becomes engineer-in-charge television outside broadcasts. Mr. Baker has been assistant

Mr. T. H. Bridgewater

superintendent engineer television since 1950. He had early experience with the television service prior to becoming engineer-in-charge at the Lisnagarvey transmitting station and serving in a similar capacity at Ottringham. Mr. Bridgewater was early associated with the old 30-line t.v. service. He has been engineer-in-charge t.v. outside broadcasts since 1946. Mr. Walker joined the B.B.C. in 1931 and went to television in 1936. From 1950 he has been engineer-in-charge of the London t.v. station. Mr. Hall started with the Corporation in 1927 as an assistant maintenance engineer. He has worked at Alexandra Palace, Start Point, and Woofferton, and has been engineer-in-charge of the Lime Grove studios for the past two years. Mr. Richardson has been with the B.B.C. for 22 years—since 1947 as assistant engineer-in-charge t.v. outside broadcasts.

Mr. L. S. Hargreaves, chairman and managing director of Aerialite, Ltd., has recently returned from a business tour of South Africa. During his visit he finalised arrangements for the flotation of Aycliffe Industries, Ltd., a subsidiary of Aerialite, Ltd., as a public company. Aycliffe Industries, Ltd., have recently completed extensions to their factory buildings which has resulted in a considerable increase in production of p.v.c. and rubber cables, and adhesive tapes.

Parnall (Yate), Ltd., announce that **Mr. F. Johnson** has been appointed home sales manager. Mr. Johnson was formally sales executive to a subsidiary in the Parnall group and joined the parent company as provincial sales manager in 1949. He fills the position vacated by **Mr. Lionel A. Moir,** whose resignation we recorded in our February 28 issue.

With the retirement at the age of 70 of **Mr. James Scrivener,** vice-chairman of Electrolux, Ltd., the domestic appliance industry has lost another of its colourful figures. He started as an apprentice with Siemens Bros., Ltd., and after gaining experience, founded in 1919 the Z Electric Lamp and Supplies Co., Ltd., and obtained the selling agency in this country for Electrolux cleaners. In those days that meant going to the docks, collecting the cleaners from the ship and then going out and selling them. Two years later Electrolux, Ltd., was founded in this country with James Scrivener as its managing director. In 1927, the manufacture of refrigerators was started at a Luton factory which has become one of the largest

Mr. J. Scrivener

Mr. J. H. R. Homfray

of its kind in Europe. To fill the vacancy on the board of directors caused by the resignation of Mr. J. Scrivener, **Mr. J. H. R. Homfray** has been elected a director. Mr. Homfray was born near Llanelly in 1892 and prior to entering commercial life had a distinguished career in the Royal Navy. He joined Electrolux in April 1926 as a refrigerator salesman and operated in Bournemouth and later in London, and became North London District Manager. In September 1928 he was appointed refrigerator sales manager, a position he held until the outbreak of war in 1939, when he was recalled to the Navy and ultimately became Commander of H.M.S. *Valkyrie*, the Radar Training Establishment on the Isle of Man. Just after the end of hostilities, he rejoined Electrolux as refrigerator sales manager, and in 1946 was promoted to general sales manager of the company.

Following the appointment of Mr. R. F. Winder, M.I.E.E., as district manager, Hendon, **Mr. F. J. Drake** has been appointed district manager of the merged districts of Hertford and Royston in the Northmet Sub-Area of the Eastern Electricity Board. He was previously district manager of Royston for 21 years, going from Stevenage, where he was first assistant to the Stevenage Electric Light and Power Co. Mr. Drake is secretary to the Royston and District Chamber of Commerce.

Mr. F. J. Drake

At the A.T.M. function; Mr. A. Bell is fourth from the left

Assistant manager and works controller of the Automatic Telephone and Electric Co., Ltd., for over twelve years, **Mr. A. Bell** retired recently. Educated at Liverpool College, he started with the National Telephone Co. in 1903, and later served with the G.P.O. until 1913 when

he joined A.T.M. only a year after its formation. From draughtsman he was promoted to head of the Power Section, and after war service became superintendent of wiring operations in 1920. Early in 1922 he went to India to supervise the installation of an automatic telephone network in Bombay, and in 1924 became installation and operating manager, holding that post till 1939. Then, when the works were turned over to defence contracts, Mr. Bell assumed the post from which he has just retired. Our photograph was taken at a farewell dinner given in Mr. Bell's honour and shows, left to right, **Mr. H. W. Barrett,** general superintendent, **Mr. W. S. Vick,** works manager, **Mr. H. Adams,** programme controller, **Mr. A. Bell, Mr. H. Monk,** methods engineer, **Mr. J. Mason,** manager, **Mr. V. T. Jones,** production manager, **Mr. A. Speight,** superintendent, and **Mr. A. Robinson,** assistant chief inspector.

The British Thomson-Houston Co. Ltd. has appointed **Mr. R. M. Grant,** B.SC., M.I.E.E., as assistant manager, Plant Sales Department, Rugby, with effect from April 1. Born in Stornoway, and graduating at Glasgow University, where he gained Honours in Electrical Engineering, he started a 3-year student apprenticeship with B.T.H. in 1929, and later, after four years in the Construction Department (London district), joined the Plant Sales Department (Rugby) in 1936 as rectifier specialist. Subsequently, he handled contracts for rotating machines for various applications, and in 1946 became the first leader of the Hydro-Electric Section. He has presented Papers to various technical societies, both in Britain and countries overseas.

Mr. R. M. Grant

Mr. W. B. Hazell, manager of the London branch of Jackson Boilers, Ltd., has just retired after serving the company for practically 30 years. Presentations were made to him recently by Mr. S. Maddock, sales director, on behalf of the directors and his colleagues on the sales staff, and by Mr. R. H. Weston on behalf of the London Branch and Service Department. Mr. Hazell was later entertained to a dinner and theatre. His successor is **Mr. R. H. Weston,** who has been on the London sales staff of Jackson Boilers for the past 25 years and assistant manager of that branch since 1937.

Sir Alexander Roger, chairman of British Insulated Callender's Cables, Ltd., Automatic Telephone and Electric Co., and the Anglo-Portuguese Telephone Co., has now returned from his extended tour of South Africa, the Rhodesias and Portuguese East Africa.

Mr. Hector V. Slade, M.B.E., T.D., A.M.I.Mech.E., deputy managing director of Garrard Engineering and Manufacturing Co., Ltd., has been elected chairman of the Radio and Electronic Component Manufacturers' Federation for the ensuing year. He succeeds **Sir RobertRenwick,**BART., C.B.E.

Mr. H. V. Slade

At the annual general meeting of the Federation of British Industries last week, **Sir Archibald Forbes,** the retiring president, was elected for a second year of office.

After over 50 years service in the Electricity Supply Industry, **Mr. E. G. Simmons,** M.S.M., A.M.I.E.E., retired recently from the position of sub-area meter superintendent in the Mid-Sussex sub-area of the South Eastern Electricity Board. Starting with the old St. James and Pall Mall Co. in 1901, he subsequently held appointments at Heston and Isleworth, and Hull, and in 1911 joined the Brighton Corporation Electricity undertaking where he later became meter and test superintendent, a position he held until vesting date. Soon after nationalisation he was appointed to the post from which he has now retired. Before a large gathering at the sub-area headquarters, **Mr. H. Pryce-Jones,** M.Eng., sub-area manager, presented Mr. Simmons with a silver tea set and a season ticket for the Sussex county cricket ground, on behalf of the Board. Mr. Simmons was later entertained to dinner which was attended by colleagues and friends.

Mr. E. T. Judge, a director and chief engineer of Dorman, Long and Co., Ltd., has been appointed a part-time member of the North Eastern Electricity Board. The Minister of Fuel and Power has also announced that he has reappointed **Mr. G. A. S. Nairn** as a part-time member of the Merseyside and North Wales Electricity Board, and **Mr. W. Newcombe-Baker,** A.I.B.A.E., in a similar capacity with the Eastern Electricity Board.

To mark the retirement of **Mr. L. Coulon** after 27 years in the electricity supply industry of the Dean Forest, with the ex-West Gloucestershire Power Co., Ltd., and the Midlands Electricity Board, Mr. D. Holt (Sub-Area manager, Central Gloucestershire) presented him with a wrist watch at a ceremony last week, and Mr. J. Blackburn, district manager, also paid tribute, on behalf of colleagues.

Mrs. M. Eaton, who has recently resigned her position as housecraft adviser with the Eastern Electricity Board at Luton, has joined the Southern Electricity Board at Greenford. On leaving Luton she was presented with a silver Georgian cruet by Mr. W. H. Kirk, district commercial engineer, on behalf of her colleagues.

On business connected with the company's export activities in Atlas lamps, Ferguson radio and Tricity cookers and the expansion of manufacturing facilities overseas, **Mr. A. Deutsch,** A.M.I.E.E., a director of Thorn Electrical Industries, Ltd., left London Airport on April 13 on a tour embracing Ceylon, Malaya, Australia, New Zealand and U.S.A.

Mr. A. Deutsch

The Corporation Education Committee has appointed **Mr. T. R. Tiplady,** B.SC., as senior science teacher responsible for the Electrical Engineering Laboratory at Brighton Technical College.

Owing to the increased demands on his time as chairman and head of the Anglo-French Mitchell Coutts group of companies, **Mr. Leonard Aldridge** has resigned from the board of Johnson and Phillips, Ltd.

Mr. W. B. Nelson has been appointed chairman of the newly formed power and fuel planning group of the State Electricity Commission of Victoria, Australia. **Mr. N. T. Jewell,** M.E.E., A.M.I.E.(aust.), is succeeding Mr. Nelson as chief of the Commission's Design and Construction Department. Mr. Nelson first joined the Commission about 27 years ago, and after five years as principal mechanical engineer, became head of the Design and Construction Department on its formation in 1948. Mr. Jewell has been deputy in the department since 1950, and was earlier the electrical engineer in charge of the electrical branch of the department.

OBITUARY

Mr. E. C. Hopkins, M.I.Mech.E., A.M.I.E.E., who was for many years managing director of G. Hopkins and Sons Ltd., engineers, electrical contractors, etc., died on April 5, aged 82. He served an apprenticeship with Yarrow and Co. Ltd. before entering the family business, in the development of which he played a prominent part. He occupied the position of managing director for a number of years, taking up a similar appointment with the present company in 1936, and from which he retired in 1948.

Dr. H. D. H. Drane, M.SC., Ph.D., A.M.I.E.E., formerly with the Ministry of Supply, died on April 5. For a time he was scientific officer at the Royal Arsenal, Woolwich. Earlier he was with the Thermal Syndicate, Ltd., in charge of research and development, then director of the Research Institute, Cawnpore, India, and assistant general manager of High Speed Steel Alloys, Ltd. He also practised as a technical consultant.

Mr. Francis Thursfield, B.A., M.Inst.C.E., M.I.E.E., who retired in 1932 from the position of general manager of the Leicestershire and Warwickshire Electric Power Co., died on April 12. He gained early training with the Electric Construction Co., and was later engaged on the Bournbrook (Birmingham) accumulator tramways, and the Liverpool overhead railway. He was subsequently borough electrical engineer at Burnley for four years, and city electrical engineer at Chester for eight years. Before joining the Leicestershire and Warwickshire Electric Power Co., he carried out the electrification of Devonport Dockyard and adjoining Admiralty establishments under Preece and Cardew, the consultants.

Mr. O. G. R. Beere, a director of the Selson Machine Tool Co., died on April 7.

NEW LITERATURE

Electrical Instruments and Measurements

by W. Alexander, B.SC., M.SC., (ENG.) M.I.E.E.

QUITE apart from its price, which is very attractive in these days of expensive 'textbooks, this small volume is one that can be recommended as likely to be of the greatest help to students of electrical engineering. It presents most clearly the essentials of a wide range of instruments, and, what is most important, it reviews their characteristics from the standpoint of the user, rather than the designer. This means, of course, that many of the tiring details covering calculations of the smaller inaccuracies are omitted, but to many this is a positive advantage. Most types of meters are succinctly dealt with under the headings: construction, operation, errors, disadvantages, and advantages. Moreover, the author does not omit to include price considerations under the last two headings.

Apart from the chapters on the various types of meters and metering, there are extra notes on the fundamental principles involved, the general problem of measuring power, power-factor, and vars, and on installation testing. To cap all of these riches, the volume is strikingly well illustrated. Published by Cleaver-Hume Press, 352 pages, 7½ in. x 5 in. Price 12s. 6d.

Electrical Phenomena at Interfaces

edited by J. A. V. Butler, B.SC., F.R.I.C.

THIS volume is a remarkable collection of essays covering the current state of research and knowledge in connection with electrical phenomena at interfaces, and extending it to its application in many sciences, including those connected with biology. It is far more science than engineering, but instrument designers are likely to find much of the information it contains of value to them. Published by Methuen, 309 pages, 8½ in. by 5½ in. Price 32s. 6d.

The BUYER'S *Column*

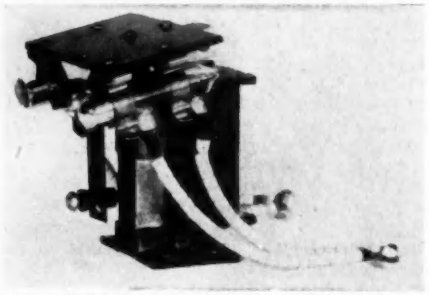
"Elremco" introduce New Relay

A RELAY capable of operating several tilting mercury tubes with switching capacity of up to 40 amperes at 230 V a.c. has been recently introduced by the ELECTRICAL REMOTE CONTROL CO., LTD., 13 and 15 Evanston Ave., London E.4.

This mercury relay type T.M.T. can be provided either with several mercury tubes having lower switching capacity (i.e. four tubes with switching capacity of 5 amps and two tubes with the switching capacity of 10 amps at 230 V a.c.) or a few mercury tubes with large capacity (i.e. one tube switching 30 amps and one 40 amps at 230 V a.c.)

The extreme simplicity of design of the type T.M.T. makes the well-known properties of the mercury tube relay even more effective.

Silicon steel laminations are used for the



Elremco's T.M.T. mercury switch relay has high switching capacity

U-shaped yoke and I-shaped armature. The mercury tubes are fitted to a rectangular Paxoline platform in turn fixed directly to the armature.

Flat and long return spring acts as a shock absorber during energisation and de-energisation of the relay. Equally the armature gap and the tension of return spring is easily adjusted by locking of adjustment screw nuts.

Other switching capacities and different number of mercury tubes can be supplied. Relay can operate a total amperage of all tubes, not exceeding 80 amperes. As required, each mercury tube can make the contact either when the relay is energised or de-energised or give a change-over action.

Standard range of coils for the relay type T.M.T. makes possible the manufacture of relays for any voltage from a fraction of a volt up to 500 V 40-60 cycles per second or up to 440 V d.c. The T.M.T. relay can be used for current or voltage operation.

The space occupied by T.M.T. relay with two 10 amperes tilting mercury tubes is $2\frac{5}{8}$ in $\times$ $2\frac{5}{8}$ in $\times$ 3 in. Four 4 BA holes in the mounting bracket of the relay make possible firm fixing.

Light where it is Wanted

NOW on the market is a crystal glass ring moulded in the form of a prism which refracts the light rays emanating from the sides of normal light bulbs and directs them in one direction.

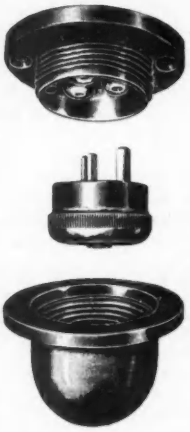
Distributors of these light rings are ALLIED DISTRIBUTING CORPORATION, LTD., 54 and 57 Piazza Chambers, W.C.2, for Lowacost (Light) Ltd., London E.C.2.

It is claimed that light meter tests show an increase of foot candle power of 120-200%: that a 40 W lamp with a light ring attached will give as much light on one surface as a 100 W lamp. Fitted with three adjustable spring clips, the Lowacost light rings will fit any lamp bulb between and including 25 W to 100 W sizes. They cost 5s. 10d., which includes 1s. 2d. p. tax.

A Universal Ceiling Rose

A MOST interesting type of ceiling rose is now available from RANTON AND CO. LTD., Rock Works, Commercial Road, Brentford.

It is basically a three-pin socket in place of the ceiling plate, into which a normal three-pin 2-amp plug is inserted. The pendant flexible cable or tube is wired through an enclosing screw-on rose to this plug.



The 'Rock' ceiling rose is simple yet practical

Advantages of this type of ceiling rose are that fittings become interchangeable; they can be installed and removed for cleaning with greater ease than in normal type suspension.

Retailers and stockists will find these ceiling roses most useful in their showrooms, for chain-carrying hooks, rigid column or industrial fittings can all be fitted up in the workshop. The makers claim that there is no need for ceiling plates or connectors, that these roses have in their own showrooms supported weights of over $\frac{1}{2}$ cwt. for a period of 12 months without any apparent ill effects.

Fitted with earth connections and drilled to fit 2-in. centres conduit boxes, the "Rock" roses are at present available in black, walnut and brown plastic, whilst a small supply of pastel shades will be available at a later date.

New Head for Wolseley Shearing Machines

THE Wolseley dual-purpose sheep shearing and cattle clipping machines, made by WOLSELEY SHEEP SHEARING MACHINE CO., LTD., Wolseley Works, Electric Avenue, Witton, Birmingham 6, are now being equipped with the new special "Ringer" shear head.

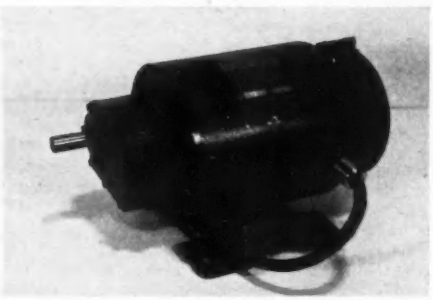
This shear head is similar in design to those which have been previously supplied for the overseas market. They have been tried, tested and proved thoroughly efficient under the most exacting conditions.

Small Geared Motors

THE motor illustrated below is one of a batch of geared electric motors made by MOTOR ELECTRICS CO., 67 Chippenham Mews, London W.9 to the order of a firm engaged in the production of spraying equipment.

The makers say that these motors are built as one unit, the gearing being integral with the motor, which is rated $\frac{1}{3}$ h.p. at 12,000 r.p.m. The gear reduces the output speed to 40 r.p.m. Of a totally enclosed pattern, these motors are suitable

Motor Electrics made this geared motor for a special order



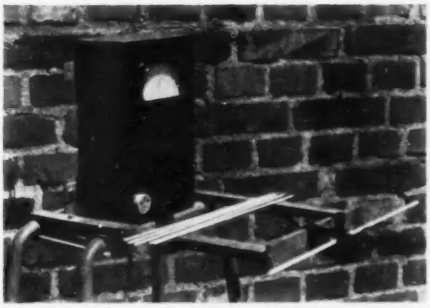
for a.c. or d.c. supplies. In this particular case a separate resistance control was supplied to give an infinitely variable speed between 40 and 10 r.m.p. or down to zero if required. At 10 r.p.m. the motor is rated $\frac{1}{12}$ h.p.

Welding Electrode Test Set

THIS electric test set supplied by THE ADDISON ELECTRIC CO., LTD., 163 Holland Park Ave., W.11, is for measuring rapidly and accurately the eccentricity of arc welding electrodes. The tests are non-destructive and can be carried out on finished as well as on unbaked electrodes.

The set serves for production checks, final tests for the adjustment of the extruding machines, as well as in the laboratory, and avoids wastage.

It incorporates a small jig into which the electrodes are laid for measurement. The indication is direct in % eccentricity, and by rotating the rod



The eccentricity of welding electrodes can be gauged with this apparatus introduced by Addison Electric Co.

it is possible to determine immediately the geometric position of the eccentricity. The electrodes may be of any length and have a maximum diameter of $\frac{5}{16}$ in. They must contain a ferromagnetic core. Measurements on aluminium copper or stainless steel electrodes cannot be carried out. Ferro-magnetic powders in the coating do not influence the measurement.

The test set is operated from a.c. supplies and has a consumption of 10 W. Portable, it contains no valves or amplifiers, and is designed for continuous operation.

There are two models available, one set housed in a wooden carrying case, including test jig and calibrating rod, with a measuring range of 0-30%, and a set similar to above but housed in a steel case and with a measuring range of 0-15%.

TRADE PUBLICATIONS

LOUDSPEAKERS.—A 16-page catalogue just issued by the Plessey Co. Ltd., Ilford, Essex, describes in detail their new range of shrouded loudspeakers.

HEATING EQUIPMENT.—A new Hurseal Heat display board featuring the range of heating appliances is now being issued to stockists for display in their own showrooms by Hurseal Ltd., 229 Regent Street, London W.1.

RESISTORS.—Latest sales leaflet issued by the Morgan Crucible Co. Ltd., Battersea Church Rd., London S.W.11, deals with the Megistor, high value glass enclosed resistor produced by the company.

INTERCOMM. EQUIPMENT.—New leaflets 1198 and 1199 just issued by Communication Systems Ltd., Strowger House, 8 Arundel St., W.C.2, are designed to bring home the advantages of Atal internal telephone systems.

PLASTICS COMPOUNDS.—"Vybak" Flexible Injection moulding compounds are described in a full colour booklet issued by Bakelite Ltd., 18 Grosvenor Gdns., S.W.1.

FLOODLIGHTING.—In a folding broadsheet the General Electric Co. Ltd., Magnet House, Kingsway, list and illustrate the units in their range of floodlighting equipment.

The WEEK in NEWS

CAPE TOWN SHUTS ELECTRICITY SHOWROOMS

A Measure to Effect Economy — Only One will Remain

A NUMBER of steps have been taken in this country to effect economies in our electricity supply industry to counter the rising costs of coal, plant and increase in wages. Among cuts which have been made has been the curtailment of advertising domestic appliances, and it has been suggested in some quarters that showrooms be closed down, although this proposal was rejected by at least one Board official (in the Midlands) on the grounds that showrooms were, in fact, remunerative. A report reaching us from Capetown, however, reveals that this very suggestion of closing down showrooms has been put forward by the Town Council's Electricity Committee and will be implemented.

All the electricity showrooms in Capetown, which have been operating for something like 20 years now, are to be shut down with the single exception of the one which forms part of Electricity House, the main offices in the centre of the city. The main purpose of this measure is to economise and in all, six centres are involved.

In advising the city council to adopt this course, the Electricity Committee has pointed out that when the council's hire purchase scheme for the sale of appliances was introduced in 1930, the advantages of the use of domestic electrical equipment were not appreciated by the public. Showrooms were accordingly established to give consumers the opportunity of obtaining information concerning what appliances existed, what makes were available, and of receiving instruction in their use. That situation no longer existed. The advantages of electricity were now well known, and a large number of traders provided adequate facilities for the display of electrical appliances in their own showrooms.

It is proposed to let the closed showrooms and use alternative accommodation for such work as the settlement of accounts. This action is expected to save approximately £3,500 a year.

BELGIAN EXPORTERS COMBINE

A NOTEWORTHY publication received during the past week is the first issue of a Review produced by the recently formed Belgelectro-Export. That organisation, which has its headquarters at 21 Rue des Drapiers, Brussels, has grouped a large number of Belgian manufacturers of electrical equipment with the object of promoting a larger export trade. The group has now risen to a formidable size, some 30 concerns in all, a full list, with brief notes on each, forming a part of the Review.

The magazine principally contains articles on the activities and achievements of some of the member manufacturers. It is to be produced at regular intervals and, as with its first issue, in special English, French and Spanish editions.

PROTESTS AGAINST TARIFF INCREASES IN THE MIDLANDS

A DEMAND that the Midland Electricity Board should revise their new tariff charges to eliminate disproportionate increases was made by Mr. J. E. Powell, M.P. for West Wolverhampton, recently. When the new charges were made known, he said, the public were told that it would produce a slightly higher revenue and that consumers would have to bear up to an 8% increase. In fact, some increases ranged up to 200%. For the small businesses and factories in Wolverhampton the tariff had been particularly severe, and, based on floor space, was thoroughly inequitable. The same applied to occupants of large houses, Mr. Powell added.

Protests in a similar vein have been made by Northampton Chamber of Commerce against the E. Midlands Board's standard industrial tariff. Industrialists in the town, it is alleged, have been asked to bear increases far greater than those in other parts of the Board's area.

The First Half-Century

Our London readers will be interested to hear that a new club called "The Electricals" is now in full swing and already possesses more than a hundred members. The headquarters are at the Bedford Head Hotel, Tottenham Court Road, and here a "house-warming" was held last Friday. Sir David Salomons, president of the club, is abroad, and in his absence Mr. C. F. Quicke, the vice-president, took the chair at the supper and the ensuing concert. The functions of the club are purely social. Electrical engineers are sociable and gregarious animals, though they will persist in talking shop; therefore the new club should have no difficulty in keeping its membership well above three figures. *From our issue of April* 17, 1902.

Investigation of Heavy Plant

New Reference to Monopolies Commission

THE supply and export of certain heavy electrical equipment is to be investigated by the Monopolies and Restrictive Practices Commission. Announcing this last week the Board of Trade stated that the new reference would cover electric generators, motors and transformers and also steam and hydraulic turbines used for driving heavy alternators. The Commission will be required to submit a report concerning both the facts and the bearing which those facts might have on the public interest.

Equipment to be covered by this report includes alternators of over 300 kW maximum continuous rating designed to be driven by turbines, and steam and hydraulic turbines for driving such alternators. This will also include condensing and feed water-heating equipment. Other alternators of not less than 10 kVA rated output will also be considered. The investigation will take in transformers of over 5 kVA rated output, and d.c. generators of output equal to over ·75 kW per 1,000 revolutions a minute and of over ·75 kW actual rating. Finally, as regards electric motors, the Commission is to report on a.c. motors of not less than one h.p. at any speed, and d.c. motors of an output equal to not less than one h.p. per 1,000 revolutions a minute and of not less than one h.p. actual rating.

Persons and companies will, of course, be able to submit evidence on the subject, and those so desirous are asked to address their communications to the Secretary of the Commission at 3 Cornwall Terrace, N.W.1.

NORWAY ORDERS LARGE H.-E. PLANT

WE learn that the G.E.C. have recently secured an order from Norway for a 62·5 MVA, 12·3 kV, 428·6 r.p.m. horizontal shaft alternator, part of additional hydro-electric plant which is to be installed at Aura Kraltonlegg. Despite her reputation for the three F's—farming, forestry and fishing—Norway is rapidly becoming industrialised. This has been brought about by a development in water power which has resulted in her ability to export at competitive prices large quantities of aluminium. It is in connection with a new aluminium plant at Sunndalsora that the plant has been ordered.

The set will be made at the company's Witton works, and will probably be one of the largest in Europe. The alternator will weigh over 310 tons, the rotor alone accounting for about 170 tons.

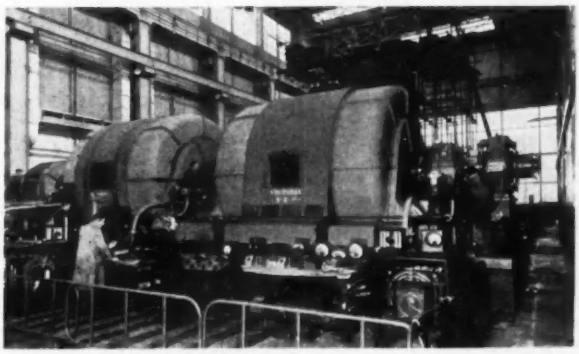
British Assoc. at Belfast

PRELIMINARY details were released last week of this year's annual meeting of the British Association. Planned for Belfast, from September 3-10, the meeting will be held under the presidency of Professor A. V. Hill, C.H., O.B.E., F.R.S., with headquarters at Queen's University. This year's chairman of Section G, Engineering, is Sir Ben Lockspeiser, who will deliver an address on "Progress in aeronautical science and engineering." Amongst papers so far promised, are those dealing with transmission-line constants; with electrical discharge in gases; with servo mechanisms; and with higher technological education. Further information can be obtained from the Secretary of the Association at Burlington House, W.1.

Frequency Changer for Melbourne

CLAIMED to be one of the largest ever made a 420-ton frequency changer recently left the English Electric Co.'s Stafford Works *en route* to the Newport power station near Melbourne, Australia. The set is 63 ft long, and will be used for transferring electric power between a system having a frequency of 25 c/s per second, and one of 50 c/s per second.

The frequency changer comprises seven machines, a 37,500 kVA, 50 c/s salient-pole machine, a 30,000 kVA, 25 c/s salient-pole machine, a slipring induction motor, two main exciters and two pilot exciters. The 37,500 kVA machine is to be connected directly to the 22 kV 50 c/s system, and 30,000 kVA machine to the 20 kV 25 c/s system. In order to facilitate synchronising, the stator of the 50 c/s machine is capable of being rocked through forty-five degrees, and the polarity of the field systems on both machines is reversible.



A view of the frequency changer while it was on test at the English Electric Co. Ltd's Stafford works

CABLE SHIP EARNS DOLLARS

THE G.P.O.'s 8,056-ton cable ship *Monarch*, probably the largest in the world, left Greenwich last week to lay a cable between points in Florida and the Bahamas. Four cables, each about 60 miles long, are to be laid, and it is understood that they are intended as a secondary means of communication for a new U.S. air base in the Bahamas. The work is expected to earn for Britain well over £45,000 in dollars and will probably take some three months to complete.

Fluorescent Lamps at Guy's Hospital

BELIEVED to be at least one of the first fluorescent lighting schemes installed in a hospital ward in this country was that carried out in the orthopaedic ward at Guy's Hospital recently. There seems to be no reason why fluorescent lamps should not have been used before, as the results at Guy's have proved entirely suitable.

The lighting units supplied by Thorn Electrical Industries Ltd. are GK/4240 fittings, housing four 2-ft. 40 W warm white lamps which provide a soft diffusion of general lighting with freedom from glare, the latter fact being, of course, especially suitable in these circumstances. The installation was carried out by the hospital's electrical staff.

HASLETT TRUST INVITES ENTRIES

THE Caroline Haslett Trust is now inviting applications for the annual award of a Travelling Exhibition. This will entitle the holder to study some aspect of the domestic electrical industry in a foreign country, the period of study, as in past years, being about three months. A condition of entry is that applicants hold the E.A.W.'s diploma in electrical housecraft, and the necessary forms of application may be obtained from the Trust at 35 Grosvenor Place, S.W.1. These must be returned to t address by May 15.

How Import Cuts affect Refrigerators

UNLESS the Government takes immediate action to deal with the situation created by import curtailments decided on by Australia, New Zealand, South Africa and France, all the good work done by our refrigeration industry in the field of exports will be irretrievably lost, commented the British Refrigeration Association last week. The only solution, it is maintained, is to allow sales in the home market of surplus domestic refrigerators which cannot now be disposed of overseas.

The restrictions imposed are likely to be of serious consequence to the industry, states the Association. In the case of Australia and S. Africa a probable loss of some £3¼ million will be sustained. Imports to the former are limited to 20% of their 1951 value and to S. Africa to 40% of 1948 imports. The fact that S. Africa has fixed 1948 as a basis is particularly bad, as British manufacturers were only beginning to get a foothold in the Union at that time.

The impact on the industry has so far been an accumulation of stocks and consequent suspension of some works with the possibility of more unemployment to follow. A vicious spiral is also faced as fewer exports mean a smaller allocation of steel, which in turn will mean that the smaller number of refrigerators will cost more, and this will result in less sales both at home and abroad.

OFFICIAL PUBLICATIONS

BRITISH STANDARDS

Amendment Slips PD 1335 *to B.S.* 215; *Hard drawn aluminium and s.c.a. conductors for o.h. power transmission purposes: PD* 1342 *to B.S.* 350; *Conversion factors and tables: PD* 1344 *to B.S.* 1678; *Cold drawn electrically welded m.s. boiler and superheater tubes: PD* 1345 *to B.S.* 512; *Hot finished seamless m.s. boiler and superheater tubes: PD* 1346; *Electrically welded m.s. boiler and superheater tubes: PD* 1354 *to B.S.* 161; *Tungsten filament general service lamps.*

INDONESIA H.M.S.O. 2s. 6d.

Review of Economic Conditions

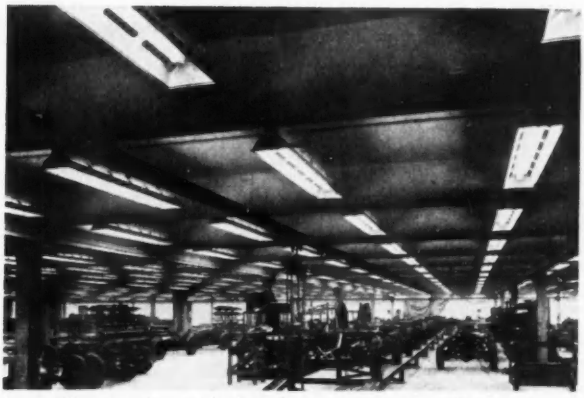
COPPER, ZINC, ETC. PRICES ORDER, H.M.S.O., 4d., S.I. 729. Revoking former Statutory Instruments.

Engineering Congress in Stockholm

THE final programme of the fourth International Mechanical Engineering Congress, which is to take place in Stockholm between June 4 and 10, has been published and is available with any further information from the British Engineers' Association at 32 Victoria Street, S.W.1.

Full details of arrangements made for visitors, the day-to-day sessions of the conference, the papers to be read (some 60 altogether), and sponsoring organisations are given in the publication. It should be noted that registration forms must be returned to the organisers by April 25.

Possibly in view of other colonial development schemes which have proved unsuccessful, Members of the House of Commons sought information on the progress of the £7 million Owen Falls hydro-electric scheme. An exhibition of photos and a model (shown here) was accordingly arranged in Westminster Hall. Although somewhat reduced in size following reproduction, readers will see the sluice gates in the centre, the power station and transmission lines on the right



Low ceiling interiors with deep beams are factors often confronting illuminating engineers, and top light in fluorescent fittings is possibly the best answer. Such an installation may be found in the 50yd x 60yd chassis assembly shop of Alvis, Ltd., Coventry, where Benjamin Type FF Flurolier reflectors have been employed. Mounting height is 9ft 4in. Contractors were the Central Electric Co., of Rushden

Complaints Before Consumers' Councils

IF details of a consumer's complaint to an area Electricity Consultative Council are published in a Press report of the Council meeting, are there grounds for legal action for infringement of copyright? This matter has been raised by the North Western Consultative Council, following the publishing of a newspaper report of the Council's meeting at which the complainant's letter was read.

The Council was subsequently told of threat of proceedings for alleged infringement of copyright. At the moment the position seems uncertain, but as a safeguard other consultative councils have been notified. Mr. G. Wray, secretary of the South Eastern Council, has said that the matter raised the question of whether or not reports to the council, which were seen by reporters, should give the names and addresses of the complainants. Yet if these details were withheld, the council might be charged with unnecessary secrecy, he added. The question is being further investigated.

New Atom Releases No Use for Generation

THE Declassification Guide, used by the U.S., Canadian, and U.K. Governments to decide what atomic energy information should be published and what should remain secret, has been revised. As a result, additional data on the nuclear properties of uranium will be released, and the revisions are likely also to extend the information available to universities and laboratories engaged in unclassified research.

Such releases of information will not help in development of military applications. Low power natural uranium research reactions cannot be used for the production of atomic weapons or for the generation of power.

FESTIVAL GARDENS TO EMPLOY OVER 40s

A MEMBER of Battersea Trades Council at a meeting last week alleged that Festival Gardens Ltd. are refusing to employ members of the Electrical Trades Union who are under 40 years of age. The reason given, it was stated, was that they have had too much trouble with militant young trade unionists.

A resolution from the Union asking Festival Gardens to consider the question was passed unanimously.

SLIGHT CHANGES IN P.T. COUPON SCHEME

FOLLOWING the changes in Purchase Tax on the introduction of the D Scheme, traders may be anxious to know what effect this has had on the experimental P.T. Coupon Scheme which enables holders of U.S. and Canadian passports to buy goods across the counter free of tax. The Commissioners of Customs and Excise have decided to continue the scheme but the procedure explained in Notice No. 77F has been modified slightly.

The main changes in the case of goods which already have borne tax are two-fold. Firstly the allowance which may be claimed on any sale under the Coupon scheme will be the amount of P.T. which the article can be shown to have borne. Secondly, direct repayment will be discontinued and the retailer will obtain reimbursement by means of a credit from the registered supplier of goods.

A revised list of goods which do not qualify for relief under the scheme has been issued, but the changes do not affect the electrical industry.

CHESSER CUP GOES TO S. WALES

THE Elizabeth Sloan Chesser cup, awarded annually by the E.A.W. to the demonstrator securing highest marks each year in the Association's diploma for electrical housecraft, may well gain the title of the most travelled electrical award. Since it was first competed for in 1937 the cup has been won by demonstrators in various parts of England, in Dublin and in the N. of Scotland Board's area, and this year it has gone, for the first time, to S. Wales.

At a luncheon in Cardiff recently, Mr. L. Howles, chairman of the S. Wales Board, presented the award to Miss M. B. Marris of the Carmarthen electricity showrooms. In response to speeches, the winner gave some sidelights on the work of a demonstrator in a rural area.

TWO SOMERSET VILLAGES SUPPLIED

AT a time when there is not a little talk about rural electrification, it is interesting to note that the South Western Board is going ahead well with its programme of connecting small villages and farming communities. We learn that the Board's Bridgwater staff have recently connected two more Somerset villages, those of Stawell and Sutton Mallet.

A notable fact about the scheme was that a pole-line erection machine was used for the first time in the district to erect the 120 poles necessary.

The demonstration in Stawell village hall after the switch-over to electricity

I.E.E. Joint Section Dinner-Dance

THE annual dinner-dance organised by the supply and utilisation sections of the I.E.E. repeated its success of last year when it was held last week under the joint chairmanship of Messrs. R. Davis and A. M. Young, the chairmen of the respective sections. It maintained its reputation for short and witty speeches, good company and smooth organisation, and all who attended enjoyed a most light-hearted evening. The principal guests were Sir John and Lady Hacking, and Mr. and Mrs. Dicksee, chairman of the Automobile Division of the Institution of Mechanical Engineers.

NEWS IN BRIEF

Technical staff of Douglas Corporation Electricity Department and the Isle of Man Electricity Board have been awarded an increase of 5% on the first £450 of salary as from March 1 in an arbitration award.

A new branch of E.A.W. has been formed at Yeovil. The branch president is Mrs. Stanley E. Vincent, the town's mayoress, and the chairman, Mrs. A. Parry. Dame Caroline Haslett was present at the inaugural meeting.

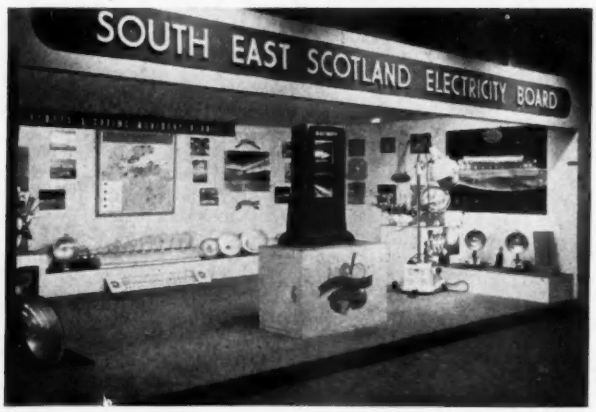
Kent branch of E.I.B.A. are holding a meeting at the Royal Star Hotel, Maidstone, today at 3 p.m., as part of a special membership drive.

In our review of the Physical Society Exhibition, published on April 3, we mentioned under the heading of "Multirange meters" that the Zenith Electric Co. engaged in this field. This was in error; in fact Zenith were not exhibiting any indicating instruments.

Birmingham Electric Club's summer visit, this time to Elan Valley Waterworks, will take place on April 25.

The L.E.B.'s Sports and Social Association staged their first square dance at Beckenham. Members of the Board and London Division attended.

In our brief report on Brook Motors' booklet (page 689) last week we inadvertently conferred a knighthood on the company's founder. The reference should have read Mr. Ernest Brook, and we apologise for the error.



There has been a great deal of talk during recent months on the possibility of floodlighting various sports arenas and thus it is appropriate that the S.E. Scotland Electricity Board took a prominent part in the exhibition organised in Edinburgh recently by the Central Council for Physical Recreation. Many prominent lamp and fittings manufacturers, in addition to E.L.M.A. and EDA co-operated by lending photographs and equipment for the stand. The photographs illustrated actual applications of artificial illumination to various indoor and outdoor sports

Questions in Parliament . . .

Radio Interference

Mr. David Gammans told the House last week that two of the committees dealing with the problem of the emission of electro-magnetic energy in relation to TV interference had reported. He added that appropriate regulations would be laid before the House as soon as possible. Replying to a further question, he said the reason for the delay in making the regulations was the difficulty in defining a precise method of determining the degree of interference.

Television Stations

Answering questions on various TV stations, Mr. David Gammans said the whole of Dorset would be covered by the high-power transmitter at Wenvoe. At first transmissions would be on low-power. As regards Pontop Pike, he said the establishment of a service there did not depend solely on the transfer of a low-power transmitter to the site as this could easily be arranged. There were other capital investments involved, such as a suitable building, high mast, and other equipment.

Tax on Heating Appliances

The Chancellor of the Exchequer answered questions on taxes on heating appliances last week. Solid fuel appliances were exempt from tax, but electric-heating apparatus were taxed at 100%, he said. There were no utility schemes, and they were not covered by the new P.T. arrangements. Referring to the admissability of the cost of the appliances in a maintenance claim, the Chancellor stated that if the new appliance and the one it replaced were both part of the building, the cost of replacement was admitted in so far as it did not exceed the cost of repair or renewal. Any excess was inadmissable as maintenance, as was the cost of appliances not part of the building.

Economic Survey

During the short debate on the question of our gold and dollar reserves, Mr. Hugh Gaitskell asked whether there was to be an Economic Survey this year and if so, when it was to be published. The Chancellor of the Exchequer said it was hoped that the Survey would be available soon after the Easter recess.

Rural Electrification

Speaking in the recent debate on Agriculture and Horticulture, Sir Thomas Dugdale had a few words to say on rural electrification. Although capital expenditure had inevitably to be restricted, he said, Electricity Boards would be able to proceed with schemes already in progress and also to start some of the urgently required new schemes. It had been decided that £3 million be spent on rural electrification instead of the £5 million originally intended, and the saving was to be obtained by the complete stoppage of new schemes. That sum had now been raised to £4 million. The Government was very much alive to the importance of this matter, he asserted.

Later in the same debate Mr. P. Remnant said he had found that there was no objection to run a main supply to new council houses but there was to connecting a whole village to that supply. No wonder there was resentment, he added.

Severn H.-E. Scheme

In a written answer, Mr. Geoffrey Lloyd stated that further consideration of the River Severn hydro-electric scheme awaited the result of experiments to determine the effect of the barrage on Bristol Channel ports. Building of the model for this work could not begin until the erection of the new Hydraulic Research Station was sufficiently advanced.

Coal Utilisation

The Minister of Fuel and Power stated last week that research and development work into the many aspects of the scientific utilisation of coal was being carried out. He was maintaining contact with scientific work in the whole field of fuel and power. The Minister added that he was satisfied adequate attention was being paid to the maximum recovery of by-products.

Electric Supply News . . .

Doncaster

Work on the new Doncaster power station at Crimpsall is now progressing well, although lack of steel supplies has caused some delays. Sections of the exterior walls of the station have risen to over 120 ft. Here, reinforced glass is being used in place of the normal brickwork. Within the next two months it is expected that the diversion of the River Don to cut out the existing loop and bring the course of the river closer to the power station, and through the new weir, which is almost complete, will be carried out. Work is about to begin on the Cheswold weir, the construction of the first of the 300 ft chimneys has started, and the sinking of piles to form the foundation for the office and administration buildings is complete, it is reported.

Falkirk

Further points in the representations made by the Falkirk Town Council regarding their dispute with the South East Scotland Electricity Board concerning the cost of a supply to the Langlees housing site, were considered by the area consultative committee last week. The T.C. suggested that in future all cables laid in Falkirk by the Board should be underground, but the consultative council declined to accept that recommendation, feeling that machinery under the Planning Act covered the matter.

Inverness-shire

An extension of the 132 kV Highland grid over the 2,507-ft high Corrieyairick Pass in Inverness-shire is proposed by the North of Scotland Hydro-Electric Board. The new line, some 25 route miles in length, will run from Fort Augustus to Glentruim, near Newtonmore, where it will join an existing 132-kV line from the Tummel Valley to Keith in Banffshire. At Fort Augustus, the new line will connect with lines taking a supply from the Affric, Garry and Moriston hydro-electric stations.

Londonderry

In response to a request from the Northern Ireland Joint Electricity Committee, Londonderry Corporation has agreed to arrange for a supply to be given to the Innishowen area of County Donegal. At the Council meeting it was stated that final details had been completed. It is understood that this new supply to Innishowen will be progressively substituted for the supply which for years past has been going to East Donegal via Lifford. There is a proviso that this sending of electricity over the Border would end if the safe running capacity of Derry electricity station were to be reached. The Northern Ireland committee is to meet the capital expenditure involved inside Derry City but apparently a share of the cost will be ultimately borne by Eire Electricity Supply Board in Dublin.

Monmouthshire

A conference took place recently between representatives of the British Electricity Authority and the Monmouthshire Planning Committee concerning a proposal of the B.E.A. to site a new generating station on land between Rhiwderin and Lower Machen.

York

Plans have been submitted to the Council by the B.E.A. for the proposed extension of the generating station at Foss Islands Road.

Seil

Electricity came to this island off the Argyll coast of Scotland, with its population of 300, last week. Connection was made to the Rannoch transmission system of the North of Scotland Hydro Electric Board. At the official ceremony, Mr. M. J. Keane, the board's area manager, said it was hoped eventually to extend supplies to the neighbouring islands of Luing and Easdale.

LIGHTING SCHEMES

Coventry.—T.C. has approved the installation of 739 street lamps at various estates, at a cost of £22,612.

Ealing.—T.C. recommended to submit to M.o.T. for approval a scheme for improved lighting along part of Western Avenue, at a cost of £17,630.

Hornsey.—Improved lighting in eight streets is recommended. Estimated cost £4,775.

Kidderminster.—Plans are to be prepared for an extension of street lighting by electricity in the town.

Meopham.—The Parish Council is considering a scheme for electric lighting of the main road, at a cost of £1,705.

Sandwich.—T.C. recommended to approve a street lighting scheme to cost £3,900.

Company Activities . . .

British Engine Boiler and Electrical Insurance Co.

Profit for the year is £191,737 (*£204,182*), to which is added interest of £43,552 (*£43,212*). To taxation £60,000 (*£85,000*), the final dividend is 21%, making 42% (*38%*), and the sum of £160,000 is placed to general reserve.

William Bate (Holding) Ltd.

This old-established firm of electroplaters report a consolidated trading profit for 1951 of £117,213 (*£95,662*) which, with other income, is increased to £118,528 (*£96,970*). To depreciation £8,876 (*£8,667*), directors' emoluments £12,110 (*£10,018*), taxation £55,300 (*£39,643*), tax equalisation reserve £3,000 (*£2,500*), leaving a balance of £37,229 (*£34,828*). After dividends, including final Ordinary of 15%, there is a balance of £25,635 (*£16,156*) carried forward.

Greengate & Irwell Rubber Co.

The parent company's net profit for 1951 is £501,077 (*£359,016*). To stock reserve £150,000 (*£200,000*), replacement of fixed assets £35,000 (*£115,000*), and to general reserve £230,000 (*nil*). The final dividend is 10% on the reorganised capital, and there is £211,363 (*£199,233*) carried forward.

W. T. Henley's Telegraph Works Co.

For 1951 the group profit is £646,447, compared with £685,559 for the previous year. That figure is struck after charging £24,695 (*£23,145*) to contract maintenance and including £13,515 (*£16,508*) profit on sales of investments. Taxation absorbs £722,197 (*£731,676*), which includes tax relief in respect of initial allowances carried to reserve of £62,037 (*£116,420*). With a final Ordinary dividend of 10% and the usual 5% bonus, the total is again 20% for the year. To replacement of buildings and machinery £250,000 (*£200,000*), reserve against fluctuations in prices of materials £200,000 (*£105,000*) and staff pension fund nil (*£177,607*). Dividends take £175,330 (*£177,607*), and there is £927,000 (*£953,477*) carried forward.

Murphy Radio, Ltd.

Group profit increased from £251,535 in 1950 to £412,927 for 1951. After allowing U.K. taxation of £225,601 (*£169,247*), overseas tax £16,775 (*£170*), and outside shareholders' interest of £2,279 (*£732*), the net profit is £168,272 (*£81,386*). The Ordinary dividend is again 10%, and there is £148,879 (*£20,260*) carried forward.

G. D. Peters and Co., Ltd.

For 1951, the consolidated profit is £184,513 (*£179,205*), plus interest of £1,686 (*£1,645*). Depreciation, etc., takes £14,757 (*£20,179*), taxation £92,500 (*£84,000*), general reserve £25,000 (*same*), contingencies reserve £25,000 (*same*), and discretionary staff reserve £10,000 (*same*). After payment of dividends, including final of 7½% plus bonus 2½%, making 17½% (*same*), there is £56,980 (*£51,991*) carried forward.

R. B. Pullin & Co.

For the year to September 30 last, the consolidated trading profit is £64,605 (*£40,039*). After charging taxation of £33,200 (*£27,820*), the net profit is £33,965 (*£16,296*), plus tax adjustment £937. To reserves £25,100 (*£7,100*), and after payment of 15% dividend there is £950 (*£897*) carried forward.

Rheostatic Co.

Consolidated trading profit for the year to September 30 last is £188,094 (*£139,906*). After charging depreciation £27,296 (*£20,448*), taxation £72,178 (*£46,328*), and other charges, the net profit is £59,466 (*£49,535*). To general reserve £30,359 (*£23,100*) and minority interest £7,453 (*£7,510*). The final Ordinary dividend is 12½%, making 16½% (*same*), and there is £33,833 (*£13,246*, carried forward.

Sangamo Weston Ltd.

The trading balance dropped from £310,260 in 1950 to £128,057 in 1951 according to the preliminary statement. The dividend is again 12½%. After depreciation and amounts written off fixed assets at £49,179 (*£50,236*), reconstruction and alterations £4,635 (*£13,214*) and taxation of £37,263 (*£137,980*), the net profit is £23,167 (*£114,614*). There is £363,246 (*£350,751*) carried forward.

Skefko Ball Bearing Co.

A proposal to increase the authorised capital from £1,000,000 to £1,500,000 is to come before the meeting shortly. There is no immediate intention of issuing additional capital, it is stated.

Telegraph Condenser Co.

Trading profit for 1951 is £468,319 compared with £329,942 for the previous year. The final dividend is 15% (*same*) making 20% on the capital which was increased by a 33⅓% share bonus. Depreciation absorbs £30,233 (*£24,885*), and taxation £219,093 (*£146,589*). There is £150,000 (*£120,000*) placed to general reserve, and £75,248 (*£49,363*) is carried forward after charging fees, management, remuneration, etc., of £22,331 (*£18,560*). The directors propose that a further £50,000 of the undivided profits of the company should be capitalised, such sum to be applied in paying up in full 100,000 new Ordinary shares of 10s. each., to be issued on the basis of one for every four Ordinary held.

Telephone and General Trust

It has been decided to offer 373,000 Ordinary shares of £1 at 23s. each to Ordinary and "A" Ordinary stockholders. When fully paid up they will rank *pari passu* with existing Ordinary stock but will not participate in any dividend for 1951. Of the total, 363,427 will be offered on a one-for-two basis and applications may be made for the remaining 9,573 shares. Provisional allotment letters were posted earlier this week.

Tube Investments

The directors propose to make a 100% scrip bonus for Ordinary stockholders. Treasury consent has been obtained.

Victoria Falls & Transvaal P. Co.

The liquidators announce that a third distribution of 8s. per £1 Ordinary unit will be made in June, making a total so far paid or payable of £7 13s. per £1 Ordinary unit.

G. and J. Weir

A 200% scrip bonus is announced by the directors. Treasury consent has been obtained for an issue of 5,382,152 Ordinary shares of 5s. each by way of capitalisation of reserves. The new shares will be distributed on the basis of two for every 5s. unit of Ordinary stock held. For 1951, the net consolidated surplus is £494,493 (*£491,991*). Final dividend is 30%, making 40%, plus 5% bonus (*same*).

Dividends Declared

Brook Motors.—Interim of 5% (*same*).

Kerry's (Gt. Britain).—Final of 10% (*11¼%*), making 15% (*same*). Group profit £234,790 (*£140,053*).

Herbert Morris.—Interim of 5% (*same*), tax free.

Max Stone.—Interim of 20% (*same*).

J. and F. Stone Lighting and Radio.—Interim of 10% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

April 18.—Edinburgh. Electrical installation in reconstruction work at 82-84 Canongate. City Architect, City Chambers.

April 18.—Manchester. Supply of electric machines and machine tools for metal work and woodwork rooms at St. Columba's R.C. school. City Architect, Town Hall. Deposit £1 1s.

April 19.—Swansea T.C. Electrical installation at West Penlan primary school. Applications by above date to Borough Architect, The Guildhall. Deposit £2. (See April 10 issue.)

April 19.—Wicklow. Wiring for electric light of 24 dwellings in Ballyhenry rural scheme—including supply of lamps and shades. Chief Officer, Housing Section, County Council Offices, Rathdrum.

April 21.—Birmingham Electrical installation in 12 blocks totalling 236 flats, and supply and erection of 14 lifts at Ward End Hall estate, St. Margaret's Ave. Documents from H. J. Manzoni, city engineer and surveyor, Civic Centre. Deposit £2 2s.

April 21.—Ashton-under-Lyne T.C. Electric wiring of 178 houses on Taunton housing scheme No. 1. A. T. Kemp, Municipal Offices. Deposit 10s.

April 21.—N. Ireland. Installation of a.c. distribution mains, switch and metering gear, and emergency d.c. supply in N.I. Fever Hospital, Purdysburn. Consulting Engineers, F. W. Parkinson and Partners, 6 Murray St., Belfast. Deposit £3 3s.

April 23.—Co. Down. Electrical installation at Kilkeel primary school. Architect, D. W. Boyd, 43 Scottish Provident Buildings, Wellington Place, Belfast. Deposit £5 5s.

April 25.—Belfast. Supply and erection of (*a*) road transport weighbridge (30 tons), tender No. N.1054; and (*b*) two sets of condensate chemical treatment plant for turbo-alternators, tender No. N.1174. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. in each case. (See March 27 issue.)

April 26.—Tandragee R.D.C. Wiring for electric light in 36 houses at Tullyhugh. D. W. Chambers, architect, Town Hall, Banbridge. Deposit £2 2s.

April 29.—Hawick T.C. Electrical installation in erection of 20 houses at Burnfoot. Documents from Burgh Surveyor, Town Hall.

April 30.—Bournemouth T.C. Rewiring at Portchester secondary boys' school. Borough Architect, Town Hall. Deposit £1 1s.

April 30.—Wiltshire. Supply and installation of six new street lighting columns and removal and re-erection of three existing columns with control equipment and cables. County Surveyor, County Hall, Trowbridge. Deposit £2.

May 1.—Dublin. Revision and extension of electrical installations at Hospital 5, St. Kevin's Instn., and complete installation for new additions for Board of Assistance. Consulting Engineer, Nicholas Mathews, 42 Fitzwilliam Place, Dublin. Deposit £20.

May 2.—Laoighis. Supply and installation of one direct-driven electrically propelled pump for Stradbally sewerage scheme. Nicholas O'Dwyer, consulting engineer, 6 Burlington Rd., Dublin. Deposit £5 5s.

May 3.—Leigh T.C. Complete installation of (a) 2·24 miles of Group A mercury vapour lighting on concrete columns; (b) 0·24 miles of Group A fluorescent lighting on concrete columns; and (c) 0·6 miles of Group A mercury vapour lighting on trolleybus poles. Borough Engineer and Surveyor, Town Hall.

May 7.—Gateshead T.C. Electrical installation in new £90,000 offices for Borough Treasurer's Dept. on Shipcote site. H. J. Cook, chief architect, Municipal Buildings. Deposit £2 2s.

May 8.—Leeds. Electric lighting installations in adaptations at 82 Cardigan Rd., Director of Works, Sweet St., Leeds 11.

May 14.—Wandsworth B.C. Installation of new electrically operated pump and other work at Putney Depot. Documents from Borough Engineer and Surveyor, Municipal Buildings, S.W.18.

No date stated.—Bangor. Electrical work in 80 houses. Particulars from Charles Hutchinson Estates, Head offices, Ardmore Ave., Finaghy.

No date stated.—Lothians and Peebles. Electrical work in erection of 2 houses at Musselburgh. County Architect of Midlothian, 32 Palmerston Place, Edinburgh.

No date stated.—N. of England. George Wimpey and Co., Ltd., invite applications from firms desirous of being placed on list for sub-contract work in Lancs, Yorks and Cheshire. Inquiries to company at 629 Eccles New Rd., Salford 5.

No date stated.—Sunderland T.C. Twelve months' supply of cookers required. Borough Engineer, J. E. Lewis, 27 Fawcett Street.

No date stated.—Trimdon (Dur.) P.C. Supply and installation of mercury vapour discharge units of 80 W type complete with 15 ft. columns on Central housing estate. Particulars from Clerk, 9 Cleveland Ave., Trimdon.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

April 23.—Belgium. Belgian State Railways require supply of eleven rectifiers for the feed-current to automatic telephone exchanges. Societe Nationale des Chemins de Fer Belges, Direction du Materiel et des Achats, Bureau 26-51, Section 9, 17 Rue de Louvain, Brussels. B.o.T. (Ref. CRE 12191/52).*

April 28.—British E. Africa. Supply and erection of two 30 kW hydro-turbine generators and one 35 kW diesel generator with switchgear and cabling for Water Treatment Works near Nairobi. Town Clerk, P.O. Box 651, Nairobi. B.o.T. (Ref.: CRE 12787/52).*

May 1.—S. Africa. Post Office invites tenders for supply of three radio telephony/telegraphy short-wave single-handed transmitters for Olifantofontein radio station. Chairman, Union Ten-

der Board and Supplies Office, 271 Visagie St., Pretoria. Ref. No. 1424.

May 5.—India. Directorate General of Supplies and Disposals, Shahjahan Rd., invites tenders for supply aluminium cable and accessories. B.o.T. (Ref. CRE 13044/52).*

May 5.—Portuguese W. Africa. Supply of sundry equipment including three grabs which must be electrically operated for port of Luanda. Luanda Port and Railway Operating Board, Luanda, Angola. B.o.T. (Ref. CRE 12033/52).*

May 5.—Uruguay. Supply of 99,950 metres of lead-covered conductors, and 41.5 metres of plastic-covered conductors for use with service tension of 220V. Gerencia Administrative de la U.T.E., Paraguay 2431, Montevideo. B.o.T. (Ref. CRE 11132/52).*

May 6.—Columbia. Equipment and installation of new automatic telephone system for 15,000 subscribers in Barranquilla. Documents from the office of the Mayor (Oficina de Negocios Generales de la Alcaldia), Barranquilla, Columbia.

May 12.—Greece. Ministry of Communications requires supply of junction telephone cable with loading and terminating equipment, and switching equipment and associated installation material for automatic central offices. B.o.T. (Ref. CRE 11274/52).*

May 15.—Pakistan. Director General of Supply and Development, Karachi, has issued call for tenders for supply of pumping plants (centrifugal, submersible and deep-well turbine pumps), diesel generating sets and trailer pumps. B.o.T. (Ref. CRE 10653/52).*

May 16.—Uruguay. Supply of 890,000 metres of wire and 550,000 metres of cable to various specifications for Administracion General de las U.T.E., Paraguay 2431, Montevideo. B.o.T. (Ref. CRE 12611/52)*.

July 15.—New Zealand. Supply of 250 suspension insulator assemblies, 325 strain insulator assemblies and 115 jumper insulator assemblies for Islington-Addington 66kV line; 800 suspension and 80 strain insulator assemblies for Stratford-New Plymouth 110 kV line. State Hydro Electric Dept., Wellington. B.o.T. (Ref. CRE 11325/52 and 11540/52).*

July 22.—New Zealand. Supply of 250 MVA 11 kV switchgear of duplicate busbar, indoor, metalclad, draw-out type and accessories for Bombay substation, Auckland. State Hydro-Electric Dept., Wellington. Documents available at N.Z. Govt. Offices in London.

Aug. 12.—New Zealand. State H.-E. Dept. invites tenders for manufacture and supply of 572 220 kV galvanised steel transmission towers for Roxburgh-Wainate section of Roxburgh-Islington line. Specifications available from N.Z. Govt. offices in London.

CONTRACTS PLACED

Birkenhead T.C. Installation of electrical services at Technical College, Grierson Ltd., £33,503.

Bishop Auckland U.D.C. Erection and servicing of 24 street lights at Cockton Hill, N.E. Electricity Board, £2,017.

Cheltenham T.C. Installation of electricity in dwellings on Arle and Hesters Way estates, J. Hearson and Co., Ltd., £1,921.

Dagenham T.C. Electrical installation on Woodlands estate, Eastern Electricity Board, £1,341.

Hull. Supply of nearly four miles of various sizes and lengths of cable, Standard Telephones and Cables, Ltd., £6,695.

Manchester. Provision of electrical installation at Crab Lane school, Sadler and Kinsey; and same at Barfield and Southernhey school. Hogg and Veale.

Poplar B.C. Electrical installations in erection of block of flats, Holiday, Hall and Stinson Ltd., £4,082.

Newcastle-on-Tyne. Electrical work at West Hartlepool General Hospital, Veale Nixon and Co., Ltd., £3,150.

Stockport T.C. Electrical installation in 53 houses on Thornley Lane estate, F. W. Cole and Sons, £2,919.

Thornaby-on-Tees T.C. Electrical installation in 78 houses at Thornaby Grange, W. S. Wilkes, £1,780.

Walsall T.C. Rewiring for electricity in Guildhall and police offices, Birch and Evans, £3,388.

TRADE NOTES

New Phone No. From April 15 the telephone number of the Ipswich Branch of British Insulated Callender's Cables, Ltd., will change to Ipswich 51265-6.

New Office. Radio Heaters, Ltd., has now opened a London office at 46 Gray's Inn Road, High Holborn, W.C.1. Tel.: Chancery 8354. That office is responsible for covering London, Home and southern counties, under the management of Mr. S. R. Hawkins.

Your Queries — Answered

"Aerovap" fly destroyers, makers of? P.B.—Shepherds Aerosols Ltd., 23a Old Bond St., W.1. (22673)

Soldering irons, repairers of? B.B.—Electromico Mfg. Co., 18a Boxmoor St., W.11. (22681)

"R.A.R." bed warmer, makers of? T.E.—Rothermel Ltd., Rothermel House, Canterbury Rd., N.W.6. (22689)

Mono Pumps Ltd., address of? D.C.—Arnfield Works, Martin St., Audenshaw, Manchester. (22694)

"Sterling" clocks, makers of? J.T.—Sterling-Croydon Clocks Ltd., Boden Works Chard, Somerset. (22701)

Electromagnetically operated power presses, makers of? R.M.—E. W. Bliss (England) Ltd., City Rd., Derby. (22714)

"Hobby" floor polishers, suppliers of? S.E.—A.E.G. Electric Co. Ltd., 131 Victoria St., S.W.1. (22718)

"B.E.N." spray guns, makers of? D.E.—B.E.N. Patents Ltd., Hughenden Ave., High Wycombe, Bucks. (22725)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Change of Address. Tymes Electric Utilities have closed their branch at 53 Great Cambridge Road, Cheshunt, and communications and goods should now be addressed to 692 High Road, Tottenham, N.17.

Scrap Copper. The Ministry of Supply has made an Order, operating from April 8, increasing the maximum controlled prices of copper and copper alloy secondary and scrap metals. The increases are: secondary unwrought copper £4 per ton, copper scrap, gilding metal, and gun metal £3 per ton, and cupro-nickel and brass £2 per ton.

New Phone No. The telephone number of Bakelite Ltd. is now Sloane 0898.

Canadian Tax Relief. In the Canadian budget for 1952/53, the 25% special excise tax on many articles, including electrical appliances and radio sets, is to be reduced to 15%, while the 15% tax on household washing machines, stoves and refrigerators will be repealed, the Finance Minister has announced.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

BRS in design. B.697,062. Class 9. Aerials, masts and insulated cables all for use in television reception. Belcher (Radio Services) Ltd., 57 Windsor Rd., Slough, Bucks.

Dawson Deluge. B686,727. Class 7. Dish and kitchen utensil washing machines. Dawson Bros., Ltd., Ventnor Works, Gomersal, near Leeds.

ELFA in design. 692,710. Class 9. Electric switches, luminous advertising apparatus, etc. 692,711. Class 10. Lighting apparatus for surgical, medical purposes, etc. 692,712. Class 11. Electric light fittings. The Electric Light Fittings Association, 103 Kingsway, W.C.2.

Gladiator. 702,466. Class 7. Electrically driven devices for aerating aquariums. James North (London) Ltd., 316 Lee High Rd., S.E.13.

Teltape. B702,108. Class 9. Magnetic sound recording and sound reproducing apparatus. G. B.-Kalee, Ltd., 37/41 Mortimer St., W.1.

Tranavator. 703,789. Class 7. Vertical elevating apparatus. Geo. W. King, Ltd., Hartford Works, Walsworth Rd., Hitchin, Herts.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	231 0 0	£220 0 0
LEAD, good soft pig (foreign)	163 0 0	152 0 0
,, ,, ,, "English" quality ...	164 10 0	
Tin (99-99.75%) ... ...(Cash)	962½-963	—
,, (3 months)	965-965½	—
ALUMINIUM, commercial purity (del.)	154 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	59 10 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

G. F. & Co. Ltd. (formerly George Forrest and Son Ltd.). Meetings of members and creditors will be held at 100 Park St., Grosvenor Sq., W.1, on May 16 at 2.15 and 2.30 p.m. resp. to receive liquidator's report.

Haden Electrical Ltd. Creditors are asked to send all particulars to liquidator, R. M. Patel, C.A., 1-2 Queen's Gardens, W.2, by April 22. General meeting is to be held at 65 Vincent Sq., Westminster, on May 5, at 11 a.m., to receive liquidator's report.

Kettlewell Electricity Supply Co. Ltd. General meeting will take place at Scarcroft Lodge, Wetherby Rd., Scarcroft, on May 23, at 12.30 p.m., to receive liquidator's report.

Harrison and Co. (Electrical) Ltd., electrical engineers. Last day for receiving proofs is tomorrow (Fri.). Liquidator is A. E. Attwood, 20-21 Lawrence Lane, Cheapside, E.C.2.

John Richards and Co. (Longton) Ltd., electrical engineers, of Stoke-on-Trent. Edwin Downard, 9 Wellesley St., Hanley, Stoke, has been appointed liquidator by members.

Wright Partners, Ltd. Resolution for voluntary winding-up passed at meeting on March 25 when Henry Pybus Humes, 8 Hart Rd., West Hartlepool, was appointed liquidator.

Companies Winding-up

A. W. Lines Ltd., electrical dealers, of Hornchurch, Essex. At first meeting of creditors it was reported that winding-up order was made on March 3. Statement of affairs as at Dec. 31, 1951, disclosed gross liabilities of £4,059, of which £121 was preferential and £1,010 due to a debenture holder. Assets were estimated to produce £1,713. The debenture holder appointed a Receiver on Dec. 31 last, who carried on business until Feb. Nearly all assets had been realised and after satisfying preferential and debenture claims and meeting other expenses he had surplus of £468. Resolution passed for appointment of A. W. Hunter, Walter House, Bedford Street, Strand, as liquidator, with a committee of inspection.

BANKRUPTCY ACTS

Intended Dividends

Birkenhead. William B. Johnson, manufacturer and retailer of neon lights, trading as "Fluorescent Neon Display Co." at 114A Brighton St., Wallasey. Last day for receiving proofs, April 22. Trustee is R. P. Booth, 5 Rumford Place, Chapel St., Liverpool.

Newcastle-on-Tyne. George S. Douthwaite, electrical engineer trading as "G. S. Douthwaite and Co." at 25 Dean St., Newcastle. Last day for receiving proofs, April 30. Trustee is R. F. Howe, Gith Chambers, 54 Westgate Rd., Newcastle.

Dividends

Windsor. Edward W. Thorne, electrical engineer trading at Blackamoor Lane, Maidenhead. First and final dividends of 5s. 1½d. in £ payable on May 1 at offices of Saker and Davis, Bedford Row House, 58 Theobald's Rd., W.C.1.

Receiving Order

Huddersfield. Norman R. Kenyon, electrical and heating engineer, trading as Joe Kenyon and Son, at Birdweld Works, Smithy Place, Brockholes, near Huddersfield. Date of order, April 2. First meeting at Official Receiver's Office, Hallfield Chambers, 71 Manningham Lane, Bradford, today (Thurs.) at 11 a.m. and public examination at County Court House, Queen St., Huddersfield, on May 21 at 11 a.m.

BUSINESS PROSPECTS

HOME

Aberdeenshire. Plans approved for erection of school at Auchnagatt. Estimated cost is £25,500.

Airdrie T.C. is to build 150 houses at Craigneuk and 30 additional houses for industrial workers.

Altrincham T.C. Construction of 88 houses on Broomwood estate. Borough Surveyor, Town Hall.

Amble U.D.C. Plans being prepared for 52 houses on Links estate.

Ashington. First instalment (£200,000) of new technical college has been included in this year's building programme. County Architect is C. C. Brown, County Hall, Newcastle-on-Tyne.

Aylesbury T.C. Forty-two houses to be built at Southcroft and California estate.

Basford (Notts) R.D.C. Erection of 180 houses in Ruddington scheme, and 110 in Calverton scheme. Council's Engineer, Surveyor and Housing Architect, J. J. G. Ellis, Rock House, Stockhill Lane.

Blackburn. It is hoped to invite tenders next September for erection of first phase of new Technical College. Plans being revised.

Bungay (Suffolk) U.D.C. Erection of 36 flats in seven blocks in Hillside Rd. Buckingham and Berry, 10 Thorpe Rd., Norwich.

Darlington T.C. Construction of 46 houses on Springfield site, 54 at Haughton West and 28 at Firth Moor. Borough Architect is E. A. Tornbohm.

Doncaster T.C. Approval granted for erection of school at Wheatley. Estimated cost is £135,640.

Dundee. Revised plans approved for construction of the Duncan of Jordanstone College Art.

Edmonton T.C. Approval received for erection of 52 dwellings in stage 1 of Fore St. development.

Glendale (Northumb.) R.D.C. Twenty houses to be built at Chatton and Wark.

Godalming T.C. Council recommended to approve plans for erection of factory for works of Electra Chemical Engineering in Catteshall Lane, for Ingram and Glass, Weydown Rd., Haslemere.

Gosforth U.D.C. Erection of 26 houses on South Gosforth Farm estate. Surveyor to Council is Clifford Wylde.

Hayes and Harlington U.D.C. Construction of 96 dwellings on Barnhill estate. Engineer and Surveyor, Town Hall, Hayes.

Jarrow-on-Tyne T.C. Sixty houses and 40 flats to be built in neighbourhood.

Lambeth B.C. Two blocks of flats to be built in borough. Director of Housing, 65-67 Brixton Hill, S.W.2.

Lichfield. Council is to build a further 60 houses.

Lincolnshire. Primary schools to be built at Gainsborough and Cleethorpes. Also two other schools at Scunthorpe. County Architect, County Offices, Lincoln.

Longbenton U.D.C. Erection of 70 houses on Fordley estate. A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall.

Maldon (Essex) R.D.C. Twenty houses to be built at Goldhanger, 16 at Purleigh and ten at Bradwell-on-Sea.

Mayo. Tenders to be invited shortly for erection of vocational school at Swinford.

Newcastle-on-Tyne. Negotiations are in hand with Sir Robert McAlpine and Sons for erection of 3,500 houses during the next three years.

Northants. Approval received for building programme which includes first stage of Kettering grammar school, extensions to Corby Technical College and erection of schools for Moulton and Rothwell-Desborough.

Northumberland. Plans approved for Ovington county school.

Nuneaton T.C. It is proposed to build 36 houses at Valley and Hickman Rds., 70 in Whittleford Rd., and 100 in Camp Hill scheme.

Potters Bar (Middlesex). Five shops with flats above to be built in Darkes Lane.

Romford T.C. Construction of 440 houses and 11 bungalows on Cross Rd. site. Names immediately to Council's Quantity Surveyors, A. S. Wilson and Partners, 8 Princes St., Storey's Gate, S.W.1.

Saddleworth U.D.C. Construction of 14 houses at Delph. Architects are Howard and Benson, 88 Mosley St., Manchester.

Salford. Erection of 36 flats in Devonshire Rd. City Engineer's Office, Town Hall, Salford, 3.

Sittingbourne and Milton U.D.C. Erection of 84 dwellings on Homewood estate. Engineer and Surveyor, High St., Sittingbourne.

South Shields. Cairns and Byles, 21 Ellison Place, Newcastle-on-Tyne, have been appointed consultants for rewiring of Gilbert St. and Stanhope Rd. schools.

Southwell (Notts.) N.C.B. is to build 314 houses in the district).

Staffordshire. Infants' school to be built at Compton.

Stalybridge T.C. Erection of 13 houses on Hague Steps site. Council's Architects, Howard and Benson, 88 Mosley St., Manchester.

Stone (Staffs.) R.D.C. Revised layout approved for development of Blythe Bridge site by erection of 106 houses, 54 flats and 4 shops.

Sunderland T.C. New housing estate of 250 acres is to be developed and will be known as the Grindon Village estate. Plans have been prepared.

Tynemouth T.C. Plans in hand for 8 shops at Morden East.

Urmston (Lancs) U.D.C. Plans approved for 36 houses to be constructed in Nursery Rd., Davyhulme.

Wakefield R.D.C. Erection of 34 houses on six sites. Council's Engineer and Surveyor, Council Offices, 18 St. John's North.

OVERSEAS

Chile. Industrias Electricas Hess May and Co. Ltd., Casilla 156D, Santiago, are anxious to obtain quotations from U.K. manufacturers for supply of small motors of 220 V a.c. 50 c/s.

Lebanon. Watlar Freres, Avenue des Francais, Beirut, wish to obtain agencies for the distribution of domestic electrical appliances, especially irons and washing machines.

Libya. The General Trade and Motor Co. of Tripoli are interested in obtaining agencies for diesel engines and alternators, motor pumps, tools, agricultural machinery and light vehicles.

U.S.A. Mr. J. B. Blangrund, president of the American Furniture Co., of El Paso, Texas, would like to receive quotations for various items, including lamps.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Francis V. Brown Developments Co. Ltd., Burman Works, 2 Sunbeam Rd., Park Royal, N.W.10. Manufacturers of and dealers in and agents for engineering products, electrical, steel, metal, wood and plastic products, etc. Cap.: £100. Dirs.: F. V. Brown and E. M. Letvinne.

Cranton Electrical Co., Ltd. To take over business of Cranmer and Whitehead carried on at 31 Barker Gate, Nottingham, electrical engineers and contractors, etc. Cap.: £200. Dirs.: A. B. Cranmer, 528 Booch Dale Rd., Nottingham; L. Waplington and Gwendoline I. Armstrong.

F. W. Drake and Co. (Electrical), Ltd., 109 Shakespeare Rd., Herne Hill, S.E.24. Manufacturers of and dealers in electrical and mechanical apparatus, in particular wireless sets, etc. Cap.: £100. Dirs.: H. R. B. Hobdell, F. W. Drake, F. H. B. Hobdell and S. Varney.

Dustmaster Units Ltd., Barkby Rd., Leicester. Heating, ventilating, air conditioning, dust and fume collecting, mechanical and electrical engineers, etc. Cap.: £25,000. Dirs.: J. E. Dallow and Miss H. G. Dallow.

EPTA Engineering Co. Ltd. Manufacturing mechanical engineers, electricians, manufacturers of electric, radio and X-ray apparatus, etc. Cap.: £100. Dirs.: A. N. W. McCammond, Tangle Copse, West Dr., Sunningdale, Berks., and H. W. Wiley.

Richard Farnworth and Co. Ltd., Ward St. Mill, Blackburn. General, precision, mechanical agricultural, motor, aeronautical and electrical engineers, etc. Cap.: £15,000. Permt. dir.: R. Farnworth.

Hancox and Co. (Bow) Ltd., 203 Church Rd., E.10. Retailers, wholesalers and merchants of electrical apparatus, etc. Cap.: £200. Dirs.: H. W. Hancox, J. H. Fitzwater and Mrs. Z. M. Hancox.

T.V. Radio Co. (Plymouth), Ltd., 15 King St., Plymouth. To take over business of wireless, television, electrical, motor and refrigeration engineers carried on as "J. T. Howard and L. C. Howard." Cap.: £1,000. Permt. dirs.: J. T. Howard and Lilian C. Howard.

MEETINGS TO NOTE

THURSDAY, APRIL 17

ENGINEERING LEGAL SOCIETY.—Dinner and address on "Public Utility Street Works Act, 1950." L. H. Welch. Holborn Restaurant, London, 6 p.m.

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Acoustics and the Radio Engineer." E. G. Richardson. Public Library, Rugby, 7.15 p.m.

A.S.E.E. (Kent Branch).—"Electrical Precautions in Operating Theatres." A. A. Mansell. County Hotel, Canterbury, 8 p.m.

I.E.E. (London Utilisation Section).—"Equipment of Battery-Electric Vehicles," W. D. Sheers; "Economic Basis of Battery-Electric Road-Vehicle Operation and Manufacture," H. W. Heyman. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (S.W. Sub-centre).—"Modern Developments in Electric Welding." H. G. Taylor. Grand Hotel, Plymouth, 3 p.m.

INST. OF WELDING (N. London Br.).—7th A.G.M., Regent St. Polytechnic, London W.1, 7.30 p.m.

FRIDAY, APRIL 18

INSTN. OF MECHANICAL ENGRS.—"Aspects of the Mechanics of the Caviation Process." Prof. R. T. Knapp. Storey's Gate, S.W.1, 5.30 p.m.

I.E.S. (Birmingham Centre).—"Light from Space." W. Wilson. Imperial Hotel, Temple St., 6 p.m.

I.E.E. (N. Staffs. Sub-centre).—Annual meeting. Discussion on "Should Measures to Limit Peak Demand be Introduced into Households by Electricity Authority?" Elec. Showrooms, Stoke, 7 p.m.

A.S.E.E. (Crewe Branch).—"Motor Fault Locating and Rewinds." D. Bosworth. Copeland Arms Hotel, Globe St., 7.30 p.m. (postponed from April 11)

MONDAY, APRIL 21

BIRMINGHAM ELECTRIC CLUB.—"The Electron Microscope." R. S. Page. Grand Hotel.

I.E.E. (London Students Section).—Address by the President, Sir John Hacking. Savoy Place, W.C.2, 7 p.m.

I.E.S. (Sheffield Centre).—Presidential Address. The University, Western Bank, 6.30 p.m.

I.E.E. (Reading).—"Electricity in Large Buildings, particularly in Post Offices and Telephone Exchanges." A. E. Penney. George Hotel, King St., 7 p.m.

TUESDAY, APRIL 22

A.S.E.E. (London).—"Electricity and Productivity." C. T. Melling. L.S.B., Savoy Hill, W.C.2, 6.30 p.m.

I.E.E. (London Measurements Section).—"Analogue Computor for Use in Design of Servo Systems," E. E. Ward; "Design and Testing of Electronic Servo-Simulator for an Hydraulic Remote Position Controller," F. J. U. Ritson and P. H. Hammond. Savoy Place, W.C.2, 5.30 p.m.

INST. OF FUEL.—"Recent Developments in Instruments." E. C. Klepp. Inst. of Mechanical Engrs., Storey's Gate, S.W.1, 5.30 p.m.

I.E.E. (N. Midland Utilisation Group).—"Economic Basis of Battery-Electric Road-Vehicle Operation and Manufacture." H. W. Heyman. 24 Aire St., Leeds, 6.30 p.m.

I.E.E. (Scottish Centre).—Faraday Lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Royal Technical College, Glasgow, 7 p.m.

WEDNESDAY, APRIL 23

RADIO AND TV SHOW.—Opens in Manchester and continues until May 3.

WOMEN'S ENGINEERING SOC. (Manchester Branch).—"Transport of Heavy Electrical Plant." A. Mycoe. Engrs' Club, Albert Sq., 6.30 p.m.

I.E.E. (London Supply Section).—"Design of H.V. High-Power Mercury-Arc Converters." H. Von Bertele and R. Tucker. Savoy Place, W.C.2, 5.30 p.m.

INST. OF FUEL.—Annual meeting at 4.30 p.m. Presidential address, "Fuel Technology and Civilisation," by Dr. G. E. Foxwell, at 5.30 p.m. Storey's Gate, S.W.1.

I.E.E. (Sheffield Sub-centre Utilisation Group).—Annual meeting. "Electrical Control of Dangerous Machinery and Processes." W. Fordham Cooper. Grand Hotel, 6.30 p.m.

I.E.E. (Southern Centre).—Discussion on "Place of Electricity in a National Fuel Policy." D. P. Sayers. Royal Beach Hotel, Portsmouth, 6.30 p.m.

THURSDAY, APRIL 24

I.E.S. (Bradford Group).—"Hospital Lighting." J. K. Frisby. Y.E.B., Sunbridge Rd., 7.30 p.m.

I.E.E. (London).—Forty-third Kelvin Lecture on "Iron Atoms in Service of the Electrical Engineer." Sir Charles Goodeve. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N.E. Scotland Sub-centre).—Faraday Lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Music Hall, Aberdeen.

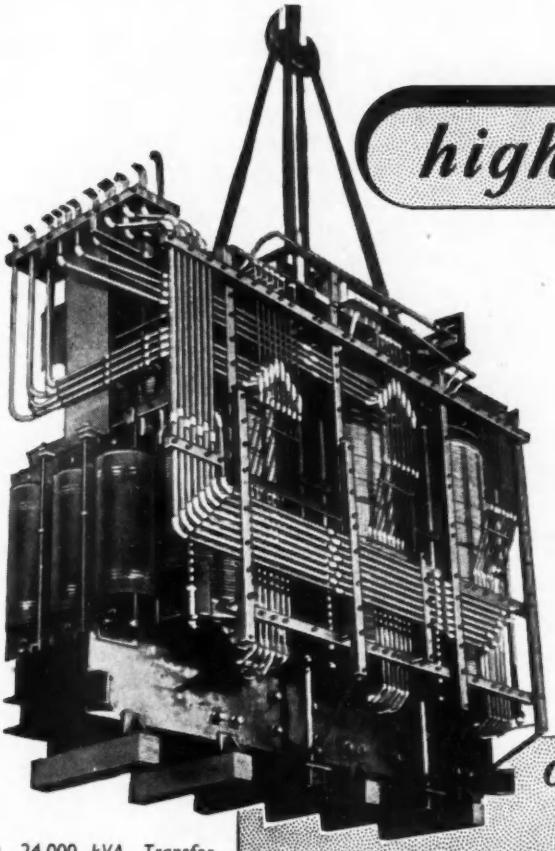
S.WALES INST. OF ENGINEERS. "Contact Welding." D. Young (Philips Electrical). The Institute, Park Place, Cardiff. 6 p.m.

FRIDAY, APRIL 25

INSTN. OF MECHANICAL ENGRS.—"Cause, Effect and Possible Remedy of Explosions in enclosed Crankcases of Steam and Internal Combustion Engines." John Lamb. Storey's Gate, S.W.1, 5.30 p.m.

E.P.E.A. (S. Meters Engrs' Technical Group).—Annual dinner at Palmerston Restaurant (Bishopsgate), 6 p.m.

I.E.E. (London Education Circle).—Discussion on "Teaching of Transients and Use of Operational Methods." Instr.-Cdr. D. K. McCleery, R.N., and H. Tropper. Savoy Place, W.C.2, 6 p.m.



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TRANSMISSION and Distribution Engineers the world over have learnt from long experience to look up to the high quality of design and workmanship in HACKBRIDGE transformers.

The Hackbridge and Hewittic Electric Co. Ltd., is very proud of this reputation, sustained over a period of more than a quarter of a century, during which over **SEVENTEEN MILLION kVA** of HACKBRIDGE Transformers have been manufactured, including a number of the world's largest units.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER—

Reigate District

SALARY of £721 to £758 p.a. under N.J.B. Schedule, Class "D," Grade 4. Superannuation will be arranged. Applicants must be experienced in the organisation of installation work and be conversant with tariffs, sales, and all aspects of service to domestic and commercial consumers. Applicants should have a thorough knowledge of domestic apparatus.

Applications, on forms obtainable from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Road, Dorking, Surrey, and giving the names of two referees, must reach him, through the Dorking Employment Exchange, by April 23, 1952.

CHARGEHAND FITTER (ELECTRICAL)—

Purley District

Wages 3s. 10½d. per hour for 44-hour, 5-day week, under the N.J.I.C. Agreement. Experience on installation and maintenance of switchgear and transformers up to 11,000 V essential.

Applications, giving two referees, must reach J. McAlister, B.Sc., A.M.I.E.E., Purley Manager, SEEBoard, Electric House, High Street, Purley, Surrey, through the Croydon Employment Exchange, by April 25, 1952.

A. L. BURNELL,
Secretary.

April, 1952. (S 111)

LONDON ELECTRICITY BOARD

ENGINEERS (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above positions in the North Eastern Sub-Area.

Applicants should have received sound general and technical education up to Higher National Certificate, or equivalent standard, and completion of an engineering apprenticeship with a manufacturer or experience in the Electricity Supply Industry, will be considered an advantage.

The posts are graded under Schedule "A" of the National Joint Board agreement as follows:—

West Ham and East Ham Barking Districts—Class "F," Grade 13—£471 to £490 per annum, inclusive of London Allowance.

Leyton District—Class "E," Grade 13—£452 to £465 per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned completed by April 26, 1952. Please enclose addressed foolscap envelope and quote ref: V/1434/T on all correspondence. (S 60)

BRITISH ELECTRICITY AUTHORITY

North Western Division

SHIFT CHARGE ENGINEER at Agecroft H.P. Generating Station, Salford, Lancs. Salary, £704 to £733 (N.J.B. G.7). Quote Vacancy No. 705.

SHIFT CHARGE ENGINEER at Generating Station, Whitehaven. Salary, £473 to £518 (N.J.B. A.7). Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before April 26. Quote Vacancy No. 703. (S 112)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT ENGINEER—Medway District

SALARY £677-£696 p.a. under N.J.B. Schedule, Class "F," Grade 7. Superannuation will be arranged. Applicants should be suitably qualified and preferably Corporate Members of the I.E.E., with experience in all work of a distribution department dealing with underground and overhead single-phase and three-phase systems up to 33 kV. and indoor and outdoor type sub-stations. Experience in the detailed preparation of proposals and estimates for system extension and reinforcement is essential and knowledge of the installation, commissioning and routine maintenance of protective equipment is desirable. Duties involve standby.

Applications, giving 2 referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, SEEBoard, 178 High Street, Rochester, Kent, through the Rochester Employment Exchange by April 23, 1952.

ASSISTANT ENGINEER—Medway District

Salary £528-£545 p.a., under N.J.B. Schedule, Class "F," Grade 11. Superannuation will be arranged. Applicants should have had experience in the maintenance and operation of three-phase and single-phase E.H.T. and L.T. overhead and underground systems, together with indoor and outdoor type sub-stations and should hold the Higher National Certificate or its equivalent in electrical engineering.

Applications, giving two referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, SEEBoard, 178 High Street, Rochester, through the Rochester Employment Exchange by April 23, 1952.

A. L. BURNELL,
Secretary.

April, 1952. (S 101)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 23/52

APPLICATIONS are invited for the following superannuable appointments at the new Uskmouth Power Station, near Newport.

(1) ASSISTANT SHIFT CHARGE ENGINEERS. N.J.B., Class "K," Grade 9 (£741-£771 per annum).

(2) STATION CHEMIST. N.J.B., Class "K," Grade 7 (£844-£781 per annum).

The classification will eventually be raised to Class "L."

Applicants for appointment (1) should preferably have obtained the Higher National Certificate and served a regular apprenticeship. Experience in a modern generating station is essential. For appointment (2) applicants should preferably possess a B.Sc. degree in chemistry and/or be Associate Members of the Institute of Chemistry or have obtained equivalent qualifications and should have had sound experience in water treatment chemistry, coal and oil testing and corrosion problems.

Forms of application, obtainable from the Divisional Secretary at the address below, should be returned by April 25, 1952.

H. J. BENNETT,
Divisional Controller.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.

April 4, 1952. (S 102)

BRITISH ELECTRICITY AUTHORITY

North Western Division

GENERAL ASSISTANT ENGINEER required in Investigation Section of Technical Department at British Electricity House. Salary, £481 to £674 (N.J.B. AX/DX 8). Candidates should possess H.N.C. in Electrical Engineering (preferably including course in Electronics) or equivalent qualification, and have experience in electronic engineering. Knowledge of power engineering would be an advantage. Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before April 26, quoting Vacancy No. 702. (S 113)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited from candidates with the necessary engineering and technical training for the following superannuable posts at Bankside "B" Generating Station. Salaries and conditions of service in accordance with N.J.B. Schedule "A," Class "G" (First Section)—ultimately "J," inclusive of London Allowance.

DEPUTY POWER STATION SUPERINTENDENT
Duties include general assistance to the Power Station Superintendent, and taking full responsibility for the power station in his absence. Grade 3—£993 6s. p.a.

MAINTENANCE ENGINEER (MECHANICAL)
Responsible for the mechanical maintenance of High Pressure Boiler and Turbine plant, with oil firing. Grade 6—£800 2s. p.a.

MAINTENANCE ENGINEER (ELECTRICAL)
Responsible for the electrical maintenance of extra High Voltage switchgear and large capacity plant. Grade 6—£800 2s. p.a.

SHIFT CHARGE ENGINEERS
Responsible for Power Station operation; experience necessary with large capacity high pressure high temperature plant. Grade 7—£739 4s p.a.

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)
To assist Maintenance Engineer (Mechanical) and deputise in his absence. Grade 9—£652 1s. p.a.

ASSISTANT ENGINEER (EFFICIENCY)
To be generally responsible for efficiency of plant, including testing. Grade 11—£580 13s. p.a.

STATION CHEMIST
Responsible for Fuel testing, control of Boiler water, Flue-gas washing, etc. Grade 7—£739 4s. p.a.

JUNIOR ENGINEERS (CONTROL)
Assistant Station Shift Control Engineers in operation of E.H.T. Switchgear. Grade 15—£417 p.a.

ASSISTANT SHIFT CHARGE ENGINEERS
Assisting Shift Charge Engineers in Plant operation. Grade 9—£652 1s. p.a.

ASSISTANT ENGINEER (STATISTICS)
Responsible for compilation of technical statistics. Grade 14—£478 p.a.

Bankside "B" Generating Station will be oil fired, and engineers with experience of this method of firing are invited to apply.

Applications, stating age, qualification and experience should be addressed to Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1., and be received within fourteen days of the appearance of this advertisement.

H. V. PUGH
Divisional Controller.
(S 110)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 21/52

APPLICATIONS are invited for the superannuable appointment of GENERAL ASSISTANT ENGINEER (OPERATIONS) in the Generation (Operations) Department at this headquarters, at a salary in accordance with the N.J.B. Agreement "AX/CX" 8 (£481-£655 per annum).

Applicants should preferably possess the Higher National Certificate or its equivalent and should have a knowledge of the control of inter-connected power systems, the operation of power station plant, and the interpretation of operation performance statistics.

Forms of application, obtainable from the Divisional Secretary at the address below, should be returned by April 26, 1952.

H. J. BENNETT,
Divisional Controller.
British Electricity Authority,
Cardiff (Pengam Moors) Airport, Cardiff.
March 7, 1952. (S 122)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the Finsbury/Shoreditch District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, with practical experience in general mains work, both A.C. and D.C. including installation and maintenance of distribution systems, also the preparation and keeping of associated records.

The post is graded under Schedule "A" of the National Joint Board Agreement as Class "E," Grade II, £529 4s. per annum, rising to £547 1s. per annum, inclusive of London Allowance.

Application forms obtainable from the Establishments Officer, 46 New Broad St., E.C.2, to be returned duly completed by April 26, 1952. Please enclose addressed foolscap envelope and quote ref: V/1435/T on all correspondence.
(S 61)

MIDDLESEX COUNTY COUNCIL

Architect's Dept.

SENIOR ELECTRICAL ENGINEERING ASSISTANT, APT. VI (£675-£740 p.a. inclusive). Capable of designing complete electric lighting, heating and power installations including the preparation of working drawings and specifications. Should hold Higher National Certificate in electrical engineering or its equivalent and have some practical experience in electrical installation work. Established, pensionable, subject to medical assessment and prescribed conditions. Appointment at grade minimum. Salary £10 less if under 26 years. Application forms (s.a.e. f'scap) from County Architect, 1 Queen Anne's Gate Buildings, Dartmouth Street, S.W.1, by May 10 (quoting K.688, E.T.). Canvassing disqualifies.

C. W. RADCLIFFE,
Clerk of the County Council.
(S 136)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

JUNIOR ENGINEER required at Walsall Generating Station, Staffs. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Class "G," Grades 16 to 14, commencing in range of £375 to £453 per annum.

Applicants should preferably have had experience in a large generating station and should possess the Ordinary National Certificate in mechanical or electrical engineering or an equivalent qualification. Duties will consist mainly of switchboard operation.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned completed by May 3, 1952.

F. W. LAWTON,
Divisional Controller.
(S 132)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

JUNIOR ENGINEER (Instruments) is required in the Chief Testing Engineer's Department at Meaford "A" Generating Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade G14, commencing at £453 per annum.

The successful applicant will be required to assist the instrument engineer in the efficient maintenance of all types of instruments associated with boilers and turbines, other than purely electrical instruments used in connection with electrical energy produced or consumed. In particular, candidates should have experience in the operation and maintenance of Bailey Automatic Boiler control equipment, and should possess the Ordinary National Certificate in electrical or mechanical engineering, or an equivalent qualification.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by May 3, 1952.

F. W. LAWTON,
Divisional Controller.
(S 133)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified engineers for the following superannuable posts:

36/52 ASSISTANT SHIFT CHARGE ENGINEER
Burton-on-Trent Generating Station.

Candidates should be experienced in the operation of modern power stations and preferably be in possession of a Higher National Certificate or its equivalent.

Commencing salary will be in accordance with Class "E," Grade 9 (£567-£579 p.a.) of the N.J.B. Agreement.

37/52 ASSISTANT SHIFT CONTROL ENGINEER
Longford Generating Station, Coventry.

Applicants should have had technical training and practical experience in a generating station and have a knowledge of control of steam generating plant and switchgear.

The salary for the above appointment will be in accordance with Class "G," Grade 14 (£453-£471 p.a.) of the N.J.B. Agreement.

Applications should be submitted on the official forms which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than May 5, 1952.

L. F. JEFFREY,
Divisional Controller.
April 10, 1952. (S 131)

BRITISH ELECTRICITY AUTHORITY

North Western Division

MAINTENANCE ENGINEER (Mechanical) at Westwood Generating Station, Wigan. Salary £762/£793 (N.J.B. G6).—Apply to Establishments Officer, British Electricity House, 625, Wilmslow Road, Manchester 20, before April 26. Quote Vacancy No. 701. (S 100)

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following posts:—

EXECUTIVE ENGINEER, ELECTRICAL AND MECHANICAL DIVISION, Public Works Department (27324/11), British Guiana. To take charge of a central workshop, dealing particularly with repairs to heavy earth-moving machinery; a central store; and a pool of transport equipment both marine and road. Also to supervise repairs to small generating plants (including wiring), submarine cables, simple transmission lines and lighting equipment. Appointment will be on agreement for three years in the first instance, exclusive of leave and passage time, with salary on scale £1,250 to £1,450 per annum. Point of entry in scale will depend upon qualifications and approved professional experience. If subsequently appointed to permanent establishment, service on agreement would count as pensionable, provided service is continuous. Free passages on first appointment and on completion of agreement for officer, his wife and children (under 18 years) not exceeding five persons in all. Leave at rate of 5 days for each complete month of resident service up to a maximum of six months. Candidates should be not less than 35 years old and should possess A.M.I.M.E. Preference would be given to candidates who also possess A.M.I.E.E. qualification.

ENGINEER, POST OFFICE TELECOMMUNICATIONS DEPARTMENT (27323/35), British Guiana. Duties are to take charge of, and be responsible to the Engineer-in-Chief for, the maintenance and operation of the landline telephone system which includes modern automatic and manual telephone exchanges, PBX's and subscribers' apparatus, with associated lines including submarine cables across rivers and carrier telephone circuits. Appointment will be on agreement for three years with definite prospect of being made permanent and pensionable subject to satisfactory service. Salary scale £750 to £900. Travelling allowance in accordance with local regulations. Leave at rate of 5 days for each complete month of resident service up to maximum of six months. Free passages on first appointment for officer, wife and children up to five persons in all. Candidates should possess (as minimum requirement) City and Guilds Final Certificates in telephone or line transmission or telecommunications principles and technical electricity or equivalents. They should be thoroughly conversant with and have had adequate practical experience in the British Post Office engineering department, or other large telephone organisation, in modern automatic and manual telephone exchange apparatus and associated power plants and test desks; installation and maintenance of PBX's, RAX's and subscribers' apparatus; construction and maintenance of external plant (overhead lines and cables and underground cables); the design of line facilities to conform to given standards and requirements for telephone services. A knowledge of carrier telephony and v.f. telegraphy systems and simple line telegraphy, as well as of the laying of submarine cables across rivers and repairs to same, would be an advantage.

Intending candidates should apply in writing to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of their age, qualifications and experience. They should mention this paper and quote the reference number shown against the post for which application is made. (S 114)

EASTERN ELECTRICITY BOARD

Chief Engineer's Department

Area Headquarters.

TWO SECOND ASSISTANT ENGINEERS

(Development Section).

APPLICATIONS are invited for the above positions at the Board's Headquarters located at Wherstead, Ipswich, Suffolk.

Candidates should have had a sound general education and technical training, with experience in the design of 33 kV and lower voltage urban and rural distribution systems, system calculations and the preparation of reports and estimates. Experience of budgeting procedure will be desirable. Corporate Membership of the I.E.E. or equivalent qualifications will be an advantage.

The salary will be in accordance with the National Joint Board Salary Agreement on Class "AX/DX," Grade 2, the commencing point within the range £809-£945 per annum of Class "AX" depending upon qualifications and experience. Both future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, technical qualifications and experience, with details of present appointment and salary should be submitted to the Chief Engineer, Eastern Electricity Board, Wherstead, Ipswich, Suffolk, within fourteen days of the appearance of this advertisement. (S 137)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT ENGINEER (OPERATION AND MAINTENANCE). (Vacancy No. 54/52).

Applicants should have had a sound practical training in the various aspects of distribution work and have attained the Higher National Certificate standard.

Salary: Class "J", Grade 10: £660 to £685 per annum.

ASSISTANT INSTALLATION ENGINEER

Doncaster District. (Vacancy No. 54/52.)

Applicants must have had a sound technical education and practical experience in electrical contracting work of all types. They must be capable of preparing and supervising schemes for all classes of domestic, commercial and industrial installations, including specifications, estimates and tenders. Experience in electrical appliance repairs would be considered an advantage. Applicants must have had considerable experience in the control of workmen.

Salary: N.J.B. Class "E", Grade 10: £535 to £549 p.a.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than May 1, 1952.

No. 7 (Grimsby) Sub-Area

GENERAL ASSISTANT DISTRICT ENGINEER

Scunthorpe District. (Vacancy No. 54/52.)

Applicants should have had experience in the construction, operation and maintenance of 11 kV and l.t. overhead and underground systems. Preference will be given to corporate members of the Institution of Electrical Engineers or holders of the Higher National Certificate.

Salary: N.J.B. Class "E", Grade 11: £504-£513-£521 p.a.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than May 1, 1952. (S 135)

BRITISH ELECTRICITY AUTHORITY

APPLICATIONS are invited for the appointment of a PERSONAL ASSISTANT to the Deputy Chief Contracts Officer at the Authority's Headquarters in London.

Wide experience with all aspects of the work of a contracts department in a large organisation is required and preferably gained in connection with contracts for heavy electrical and mechanical plant and civil engineering work.

Salary £590 to £651 (N.J.C. Grade 4) including London Allowance. Appointment is permanent and superannuable.

Apply by May 4, 1952, giving age and detailed experience to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London W.1. Reference AE/239. (S 134)

A WELL KNOWN COMPANY requires SENIOR ENGINEERS for its Meter and Relay Division in the Midlands. Ideal working conditions, salaries of up to £1,400 per annum.—Write, giving full details of previous experience, qualifications and age to Box No. 1653, Electrical Times. (S 81)

ACCOUNTS COST CLERK for Electrical Contractors, W. End. Previous experience essential.—Full details to Box No. 1625, Electrical Times. (S 8)

AN ELECTRICAL ENGINEER is required by a well-known company for interesting work in the London area. Good all-round knowledge of D.C. and A.C. machines of up to 50 h.p. and their control gear is essential. Applicants should be familiar with marine applications of these machines and be capable of preparing specifications and vetting and testing of designs.—Write, giving full details, mentioning ref: IDA, to Box No. 1647, Electrical Times. (S 69)

APPLICATIONS are invited from ENGINEERS preferably aged 23 to 28 years, who have served a recognised apprenticeship with an electrical or mechanical engineering manufacturer and hold a Higher National Certificate or equivalent for progressive appointments in the standards and specifications department, Stafford. This department is concerned with the specifying and codifying of techniques, processes and materials used in the whole range of the company's manufactures. Permanent positions and pension scheme.—Write, stating age, qualifications and experience quoting reference 947A to Central Personnel Services, English Electric Company, Ltd., 24-30 Gillingham Street, London, S.W.1. (S 138)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

APPLICATIONS are invited for the post of CHARGE ENGINEER in a large modern power station near London. Applicants, whose age should not be less than 35 years, must have had considerable experience in the efficient operation of large pulverised fuel-fired boilers, modern turbo-alternators, and e.h.t. systems and distribution. Non-contributory pension scheme. Commencing salary £840 p.a.—Reply to Box No. 1665, Electrical Times, quoting ref. CE. (S 103)

BIRMINGHAM AREA REPRESENTATIVE wanted by leading manufacturer of rotary, tumbler and motor control switches. Established connection with electrical manufacturing concerns essential. The successful applicant will be required to join staff and should possess own car.—Write, stating experience, age and remuneration expected to Box No. 1671, Electrical Times. (S 141)

BRUSH ELECTRICAL ENGINEERING CO., LTD., require:

HOME SALES MANAGER.

LONDON OFFICE MANAGER.

SHEFFIELD OFFICE MANAGER.

Each to be responsible to the Sales Director (local) for the particular sales administration. Candidates must be corporate members of I.E.E. with sound technical training and considerable sales experience. Age range 30-40 years.

SALES SPECIALIST (Rotating Machines).

To advise customers on problems dealing with the application of electric motors and also with the supply of alternators for diesel engine drive. Candidates must have Higher National Certificate or equivalent; sound technical training and sales experience.

Full details of qualifications and experience in confidence to the Personnel Director, 32 Duke Street, London, S.W.1. (S 119)

BRITISH ELECTRICITY AUTHORITY require a CHIEF ASSISTANT to the Generation (Operation) Engineer in the Chief Engineer's Department at Headquarters in London.

The successful candidate will carry out research in operation, repair and maintenance of generating plant, including efficiency, economy, availability, analysis of breakdowns and repairs.

The salary will be within the provisional range £1,500 to £2,000, including London allowance. Pension scheme.

Applications to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London W.1, not later than May 4. Quote Reference AE/240. (S 130)

CABLE manufacturers, London area, require a CHEMIST with experience of enamelled wire manufacture, using both oleo-resinous and synthetic enamels. Our staff have been informed of this advertisement.—Reply, stating age, and details of qualifications and experience, to Box No. 1667, Electrical Times. (S 105)

ELECTRICAL DESIGNER-DRAUGHTSMAN required for consulting engineers office. Must be experienced in the layout and design of installations covering factories, hospitals, schools, etc.—Apply, giving details of training and experience to: Hoare, Lea and Partners, 32 Deansgate, Manchester 3. (S 120)

ELECTRICAL DRAUGHTSMAN, some experience industrial installation work, required by consulting engineers, Victoria.—Write, giving experience, age, salary required, to Box No. 1659, Electrical Times. (S 95)

ENGINEER, technically qualified and experienced in the design and manufacture of supertension cable, required for permanent senior appointment.—Applications, which should be fully detailed and marked "Engineer," will be treated in strict confidence. Aberdare Cables, Ltd., Aberdare, Glam. (S 67)

EWBANK AND PARTNERS LTD., have vacancies for the following:—

ELECTRICAL ENGINEERING DRAUGHTSMEN experienced in power station and sub-station distribution systems.

MECHANICAL ENGINEERING DRAUGHTSMEN experienced in power station design and layout, pipework layout, circulating water systems or coal and ash handling plants.

TRACERS (FEMALE) experienced in power station and general engineering work.

The positions are permanent and are pensionable. Free lunches are provided and a five-day week is in operation. —Applicants should write in first instance, stating age, details of experience and salary required, to: The Secretary, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, S.W.1. (S 115)

IMPERIAL CHEMICAL INDUSTRIES LIMITED, General Chemicals Division have the following vacancies:—

SENIOR ASSISTANT ENGINEER (GENERATION). P/1. Applications are invited for the position of additional Senior Assistant Engineer in the Generation Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Generation Section Manager in the headquarters of the Department, with the operation and maintenance of the Division's power stations and with the design of extensions thereto. Applicants who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical or Electrical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the operation and maintenance of large modern high pressure steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and of investigations and tests in connection therewith, while Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.

SENIOR ASSISTANT ENGINEER (MECHANICAL). P/2. Applications are invited for the position of additional Senior Assistant Engineer in the Mechanical Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Mechanical Section Manager in the headquarters of the Department, with the maintenance of the mechanical equipment of the Division's power stations and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the maintenance and design of the mechanical equipment of large modern steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while Corporate Membership of the Institution of Mechanical Engineers is also desirable. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.

ASSISTANT ENGINEER (GENERATION). P/3. Applications are invited for the position of Assistant Engineer in the Generation Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the General Section Manager, in the headquarters of the Department, with the operation and maintenance of the Division's power stations and with the design of extensions thereto. Applicants, who should be between the ages of 28 and 35 years, and should hold a Degree in Mechanical or Electrical Engineering or a Higher National Certificate in Mechanical or Electrical Engineering, must have had a sound mechanical training and good experience of the operation and maintenance of modern high pressure steam power stations. In addition, they should have had some experience in the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while membership of the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable.

The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund. Applications in writing, giving age and full particulars of education, technical qualifications, engineering training and power station experience, should be sent to The Staff Manager, Imperial Chemical Industries Limited, General Chemicals Division, Cunard Building, Liverpool, 3, quoting reference P/1, P/2 or P/3 as appropriate. (S 118)

FOREMAN/JOINTER

A FOREMAN/JOINTER is required for work in Singapore and Malaya. The engagement will be on a 3-year agreement at a salary of $475.00 Malayan dollars per calendar month with a cost of living allowance of $175.00 Malayan dollars per month. (The current rate of exchange is $8.55 Malayan dollars=£1 sterling); bachelor quarters will be provided free. Air passage to Singapore will be paid and a return passage (with 18 weeks leave on full pay) will be provided on the satisfactory conclusion of the service period. Applicants should be unmarried and should have experience of all types of power cable jointing up to and including 11 kV. The successful applicant will be required to fly to Singapore in August, but in the meantime employment can be offered at London rates on cable installation contracts in Great Britain. Applicants should state age and experience in detail in addition to name and address.—Please apply to:—

Box No. 1639

Electrical Times

(S 54p)

FOSTER TRANSFORMERS & SWITCHGEAR LTD.
South Wimbledon, S.W.19
require
TRANSFORMER DRAUGHTSMEN
and
TRANSFORMER TESTERS

Annual bonus in addition to generally recognised pay rates. Good working conditions in modern factory with welfare and canteen services and active Sports and Social Club. Conveniently situated with good tube and bus services. Apply to the Personnel Officer. (S 139p)

IMPERIAL CHEMICAL INDUSTRIES LTD., General Chemicals Division, Cunard Building, Liverpool 3, invite applications for the position of SHIFT CONTROL ENGINEER in the company's power department for control room duties at West Bank Power Station, Widnes. Applicants, who should be between the ages of 25 and 30 years, should have had a sound practical training in electrical engineering, and should hold at least a National Certificate in electrical engineering, while some experience of the electrical operation of modern power stations is also desirable. The selected candidate will be required to pass a medical examination and to join the company's staff pension fund.—Apply to a local Ministry of Labour Employment Exchange. (S 128)

JOHN BRUCE AND PARTNERS, Consulting Engineers, invite applications from MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL ENGINEERING DRAUGHTSMEN. Applicants should have a wide experience of power station layout work, industrial steam and electrical work, supervision of site work and, for one or two vacancies, a knowledge of Spanish is desirable. Applicants should not be over forty-five years of age. Location of office work—London.—Applications, in the first instance, should be addressed to Box No. 1627, Electrical Times. (S 19)

LANCASHIRE DYNAMO AND CRYPTO (MFG.), LTD., have vacancies for COLLEGE GRADUATES for two-year apprenticeship course. Applicants must possess a B.Sc. degree or Higher National Certificate in electrical engineering. Suitable applicants will be eligible for permanent position after completion. Pension scheme in operation. Applications, stating details of training, experience and age, to Personnel Manager, Lancashire Dynamo and Crypto (Mfg.), Ltd., Trafford Park, Manchester 17. (S 129)

MAINTENANCE ELECTRICIAN required for Engineering Works. Candidates to have had experience on the following equipment: a.c. and d.c. machinery; electrical equipment on modern machine tools; and a knowledge of industrial electronics.—Box AC 71528, Samson Clarks, 57/61 Mortimer Street, W.1. (S 108)

MANAGER required for Suburban Electrical Retailers and contractors (London). Good opportunity for man with knowledge and initiative.—Write, stating full details of experience and salary required, Box No. 1655, Electrical Times. (S 82)

MECHANICAL ENGINEER-DRAUGHTSMAN required for steam power station design. Previous power station experience not essential, but applicants must have layout experience. Salary fully appropriate to experience and capabilities. Excellent working conditions.—Apply, in writing, to Merz and McLellan, "Milburn," Esher, Surrey. (S 140)

MUNICIPAL MUTUAL INSURANCE LTD. has a vacancy for an ELECTRICAL ENGINEER SURVEYOR in London. Post is permanent and pensionable to satisfactory candidate, who should be 25-35 years of age, have served an apprenticeship in electrical engineering and have sound practical and theoretical knowledge. Technical qualifications: Higher National Certificate or equivalent. Salary: £520 to £750.—Apply, in own handwriting, marking envelope "Application, Electrical Engineer Surveyor," to Chief Engineer, 22 Old Queen Street, Westminster, S.W.1. (S 124)

PARTRIDGE, WILSON AND CO. LTD., Davenset Electrical Works, Leicester, require DESIGNER ESTIMATORS for transformer section dealing in air and oil-cooled types up to 500 kVA capacity; also personnel for test department dealing in same class of product.—Apply in first instance by letter, stating age and experience. (S 104)

PERMANENT positions with excellent opportunities will be offered to applicants suitably qualified for the following:—

(a) DESIGNERS experienced in electronic control gear. Good electrical and mechanical design and layout ability essential.

(b) SENIOR DRAUGHTSMEN with electrical/mechanical experience required for motor control gear. Knowledge of electronics advantageous, thorough shop training and extensive drawing office experience essential.

(c) DRAUGHTSMEN required for mechanical and electrical work on industrial electronic equipment. Experience on this type of product, whilst an advantage, is not essential, and men with good electrical or mechanical drawing office experience will be considered.

Vacancies exist in a new factory in the Stoke-on-Trent area or in the Company's London office.—Replies, giving full details of training, experience, also age and salary required, to be sent to Box No. 1657, Electrical Times. (S 93)

SENIOR DRAUGHTSMAN, deputy to Chief Draughtsman, required by Crompton Parkinson Ltd., Chelmsford, to deal with industrial a.c. and d.c. machines up to about 1,500 kW.—Applicants, who must have had extensive experience in this class of work, should write, giving age, full details of training and experience, to Personnel Officer. (S 117)

TRACTION SUPERINTENDENT required by Crompton Parkinson Ltd., Chelmsford, to take charge of the production of railway, trolleybus and tramway motors, diesel-electrical equipment, etc.—Applicants, who must have had extensive experience in this class of work, should write giving age, full details of training and experience to General Manager. (S 116)

TRANSFORMER SALES ENGINEERS are required by the English Electric Co. Ltd., at Stafford. Preference will be given to applicants who have served a recognised apprenticeship in heavy electrical engineering and who are of at least H.N.C. standard.—Please write, giving full details and quoting Ref. 396B, to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (S 94)

APPOINTMENTS WANTED

SENIOR EXECUTIVE, electricity supply industry, returning U.K. April, from overseas, 36 years, Hons. Degree Economics, 13 years' wide administrative experience, economic, organisation, personnel problems, seeks progressive administrative executive post U.K. or Canada.—Box No. 1651, Electrical Times. (S 72)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE RE-WINDING SERVICE to the trade. Vacuums, drills, grinders, hood dryers, dental motors, vacuum cleaner armatures replaced from stock, 24-hour service. Every job guaranteed.—Regam Electric, 95-97 Park Lane, Leeds 1. (S 142)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (P 570)

METALWORK. All types, cabinets, chassis, racks, etc. to your own specifications.—Philpott's Metalworks Ltd., Chapman Street, Loughborough. (P 695)

ZEROS REFRIGERATORS. Complete range of REPAIR AND SERVICE now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Ltd., Refrigeration Specialists, 60 Southend Road, Rainham, Essex (Rainham 2358), or Southern Area Agency (Tel.: Springpark 4217). Electrical spares supplied to the trade. (S 96)

WANTED

A.C.—D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

BALL, Roller and Taper Roller Bearings purchased. Good prices paid.—Offers to Berend and Berend, Ltd., 62 Berners Street, London W.1. (R 333)

REVOLVING FIELD-TYPE ALTERNATOR, 150 kVA, 100 cycles, voltage and speed immaterial. Must be in sound mechanical condition. Ball-bearing machine preferred.—Full details to Box No. 1661, Electrical Times. (S 97)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices paid, small quantities accepted.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (S 23p)

80,000

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES in stock. Advise requirements.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (S 21p)

TRANSFORMER, 750 kVA, phases —3 and neutral. Periods 50. Input 6,600 V. Output 400 V.—Ellis and Ward, Ltd., 179 Corporation St., Birmingham 4. (S 121)

WANTED: All types of Stationary Diesel Engines. Also Horizontal Hornsby Lamp Start Paraffin Engines.—Sippy & Co., Ltd., 118 Pepys Road, London S.W.20. Tel.: Wimbledon 5964. (S 125)

WANTED: One d.c. Shunt or Compound Wound 460 V. MOTOR, nominal continuous rating 110/120 h.p. at approximately 1,500 r.p.m. This speed to be obtained by armature voltage control without weakening of the shunt field. The armature preferably to be suitable for over-speeding to 2,000 r.p.m. for 1 minute from another motor. The motor is also required to produce 200 h.p. at 1,500 r.p.m. for 4/5 minutes, at very infrequent intervals. No starting gear is required.—Box AC 71389, Samson Clarks, 57/61 Mortimer Street, W.1. (S 73)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED: Surplus Stocks of Twist Drills, Milling Cutters, Hacksaw Blades, Reamers, Chasers and all kinds of hand and cutting tools.—Send details to B. Draper and Son, Kingston Hall Road, Kingston-on-Thames. (A regular buyer of surplus tools.) (R 434)

CABLES & WIRE

CABLE, 7·052 PBJ 100,000 yards for sale from stock.—S. G. Young, 154/6 Blackfriars Road, S.E.1. WATerloo 3131. (S 20)

10 CORE T.R.S. FLEXIBLE CABLE 14/0076, 250 V class insulation on 300-yard drum, £20 per drum.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. Tel.: Stainland 2120. (S 46)

ENGINEERING PLANT & MATERIALS

BALL BEARINGS AND MINIATURES. Most sizes from stock, i.e. R. and M. series, etc. Also metric sizes. —J.N.P. (London), Ltd., Salters Court, Bow Lane, E.C.4. (S 143)

CASTINGS

Supplied in

GREY IRON and all Non-Ferrous METALS

Machining and Pattern Making

Enquiries Welcomed

DOVER INDUSTRIES LTD.
Eastern Docks, Dover
Telephone 582 (S 1p)

BROWN PORCELAIN LINE INSULATORS. Brand New. American pattern approximately 5¼ in. overall; aperture for ⅝in. cable. Only a few left, 1/6 each in boxes of 100. Cash with order.—John Cashmore, Ltd., Great Bridge, Tipton, Staffs. (S 76)

BRASS RODS BSS. 249

FROM STOCK, MOST SIZES AVAILABLE.

from ½ in. - 2 in. dia.

DYAS & FOWLE
41 LOUDON ROAD, LONDON, N.W.8
Telephone: MAIDA VALE 5477, 5489, 8641.
(R 448p)

FOR SALE—ELECTRIC PUMP 1,500 g.p.h., head 20 ft. coupled to 1 b.h.p. 1,450 r.p.m. 400-V 3-phase motor. —Box No. 1669, Electrical Times. (S 106)

LARGE Stocks all types BALL AND ROLLER BEARINGS.—Send detailed inquiries to Selsand, Ltd., 4 Rathbone Place, London W.1. (S 74)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW, no purchase tax. All lengths 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Prompt delivery.—Write for latest lists and trade terms to Distributors, John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (C 392)

IMMERSION HEATERS, "MORAHEAT" 4 kW, with Satchwell Thermostatic Control, 16 in. to 42 in. Fully guaranteed, reliable, competitive, good deliveries.—Apply, Agent, W. Tyler, 20 Finnemore Rd., Little Bromwich, Birmingham. (R 304)

GENERATING PLANT

ONE 40 kW d.c. DIESEL GENERATING SET, 220 V, 700 r.p.m., complete with switchboards, etc.—Sippy & Co., Ltd., 118 Pepys Road, London S.W.20. Tel.: Wimbledon 5964. (S 127)

PETTER Atomic DIESEL ENGINE, 3 cylinder, 168 b.h.p. at 410 r.p.m. Water cooled 2 stroke. Direct injection, cold start.—Details, photo, F. J. Edwards, Ltd., 359 Euston Road, London N.W.1. Euston 4681. (S 126)

DIESEL GENERATORS

by

HOUCHIN

100 kVA GMC generating plant now available for almost immediate delivery to the home market only.

Incorporating the famous HLD alternator.

Details and specification on request from the actual manufacturers

THE HOUCHIN ORGANIZATION
Garford Works, Garford Street, London, E.14
Tel. East 4123 (5 lines) Grams: Garfodia, London
(P 733p)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. Ballast, with Starter Switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings. 57.6 each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818-9. (E 343)

METERS

A.C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gdns, N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly, single and three-phase, 3 and 4 wire, 2½ to 1,000 amps. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I., billiards switches, rent collectors. Prices from 5s. Carriage paid. Guaranteed for ever. Immediate delivery.—Illustrated catalogue from The Electric Meter Co., Castor Road, Brixham. (R 360)

MOTORS & STARTERS

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Babcock & Wilcox, Ltd. 8
Barbour, Wm. & Sons, Ltd. ... 59
Bayliss, Jones & Bayliss, Ltd. ... 21
Belling & Co., Ltd. 51
Bill Switchgear, Ltd. 5
British Electric Lamps, Ltd. ... 62
British Insulated Callender's Cables, Ltd. 19
British Thomson-Houston Co., Ltd. 36
Burn, George, Ltd. 56

Carter, B. & F., & Co., Ltd. ... 66
Chilton Electric Products, Ltd. ... 60
Clang, Ltd. 60
Connollys (Blackley), Ltd. ... 58
Cressall Manufacturing Co., Ltd. 4
Crypton Equipment, Ltd. ... 30

Desoutter Brothers, Ltd. ... 55
Drake & Gorham Wholesale, Ltd. 54

Edison Swan Electric Co., Ltd. ... 61
Ega Electric, Ltd. 4
Electric Construction Co., Ltd. 40
Electrical Instruments (Hillington), Ltd. 60
Ellison, George, Ltd. 38
Enfield Cables, Ltd. 27
Engel & Gibbs, Ltd. 50
English Electric Co., Ltd. ... 3
Erskine, Heap & Co., Ltd. ... 20
Eva, Alfred, & Son 56

Falk, Stadelmann & Co., Ltd. ... 10
Ferranti, Ltd. 37
Ferranti Denis, Ltd. 70
Franco-British Electrical Co., Ltd. 58

General Cable Manufacturing Co., Ltd. 12
General Electric Co., Ltd. 13, 63

Hackbridge Cable Co., Ltd. ... 66
Hackbridge & Hewittic Electric Co., Ltd. 41
Heayberd, F. C., & Co., Ltd. ... 62
Henley's W.T., Telegraph Works Co., Ltd. 1
Heyes & Co., Ltd. 14
Hick Hargreaves & Co., Ltd. ... 70
Hotpoint Electric Appliance Co., Ltd. 26

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Measuring Instruments (Pullin), Ltd. 16
Metallic Seamless Tube Co., Ltd. 42
Metropolitan-Vickers Electric Co., Ltd. 33, 65
Metway Electrical Industries, Ltd. 4
Micanite & Insulators Co., Ltd. ... 2
M.K. Electric, Ltd. 6

Nettle Accessories, Ltd. ... 22
New Day Electrical Accessories, Ltd. 50

Parnell (Yate), Ltd. 69
Pinchin Johnson & Associates, Ltd. 64
Pritchett & Gold & E.P.S., Co., Ltd. 17

Ransome & Marles Bearing Co., Ltd. 32
Renfrew Foundries, Ltd. ... 25
Revo Electric Co., Ltd. 67
Reyrolle, A., & Co., Ltd. ... 23

St. Catherine Press, Ltd. ... 64
Salter, George, & Co., Ltd. ... 7
Sanders, Wm., & Co. (Wednesbury), Ltd. 66
Scholes, Geo. H., & Co., Ltd. ... 28
Siemens Brothers, Ltd. 68
Smith, Frederick, & Co. 53
Sperryn & Co., Ltd. 18
Stainless Steel Wire Co., Ltd. ... 22
Standard Telephones & Cables, Ltd. 16
Statter, J. G., & Co., Ltd. ... 64
Steel Company of Wales, Ltd. ... 11
Sturdy Electric Co., Ltd. ... 56
Symonds, R. H., Ltd. 59

Transformer & Electrical Co., Ltd. 66

V.G. Manufacturing Co., Ltd ... 54

Wandleside Cable Works, Ltd. ... 64
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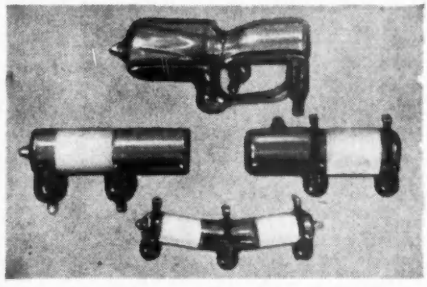

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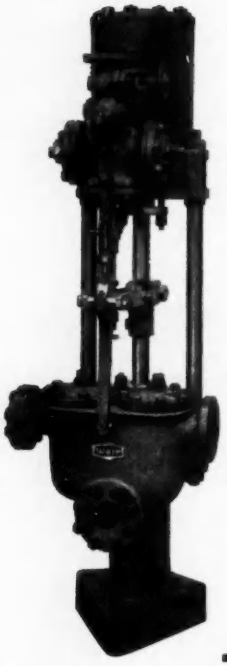

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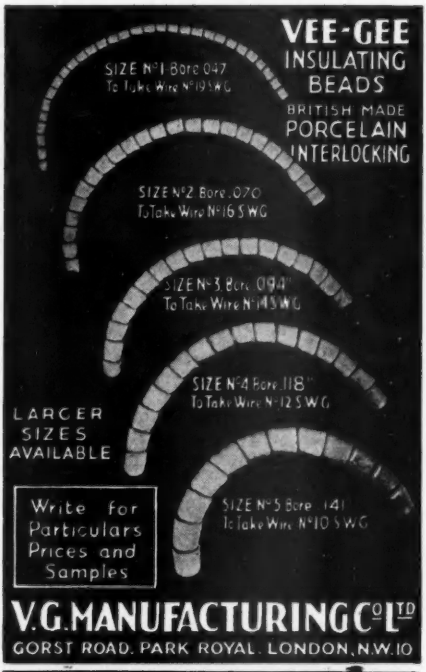

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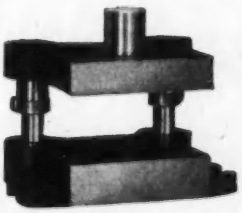

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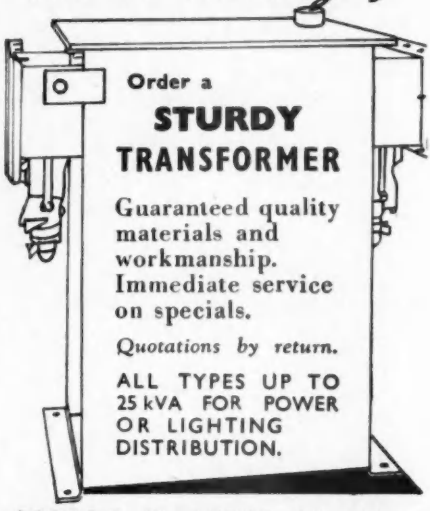

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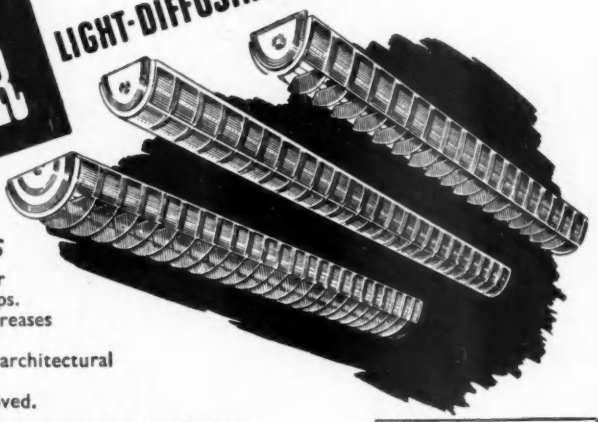

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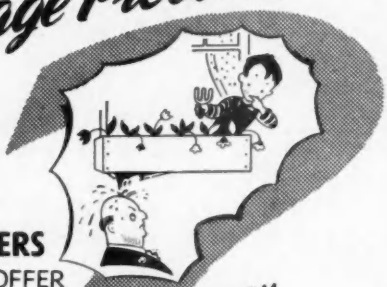

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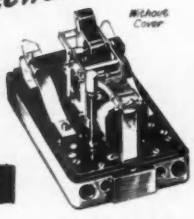

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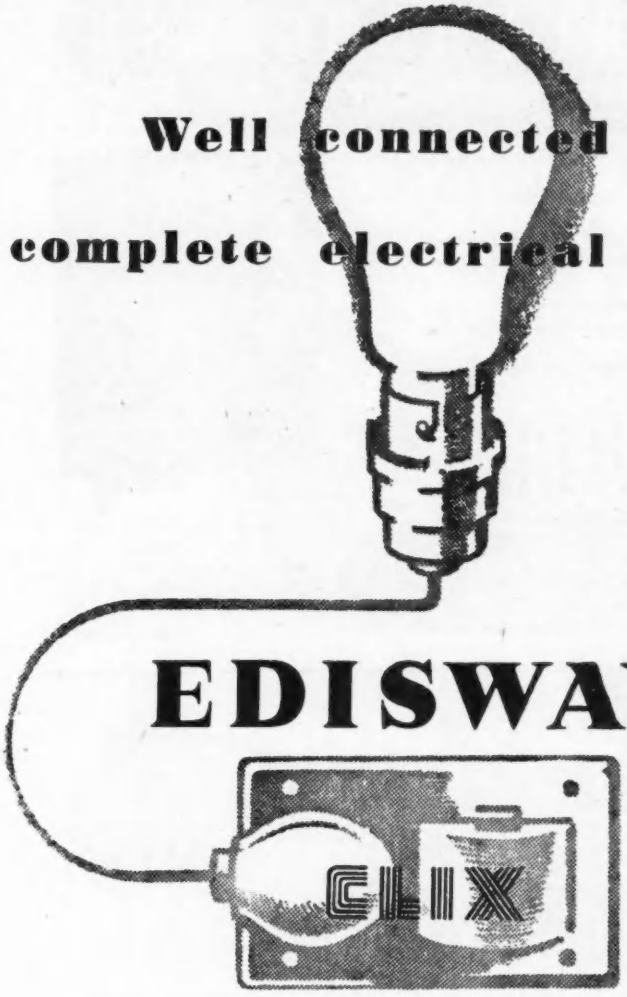

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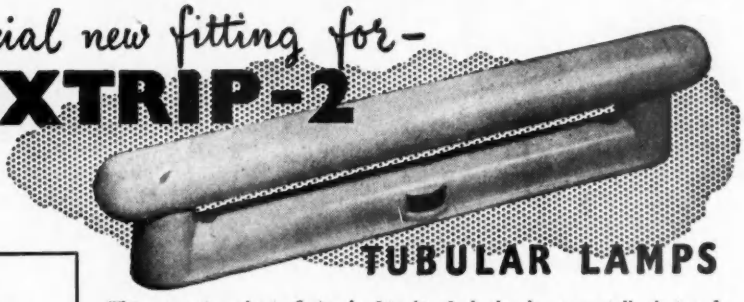

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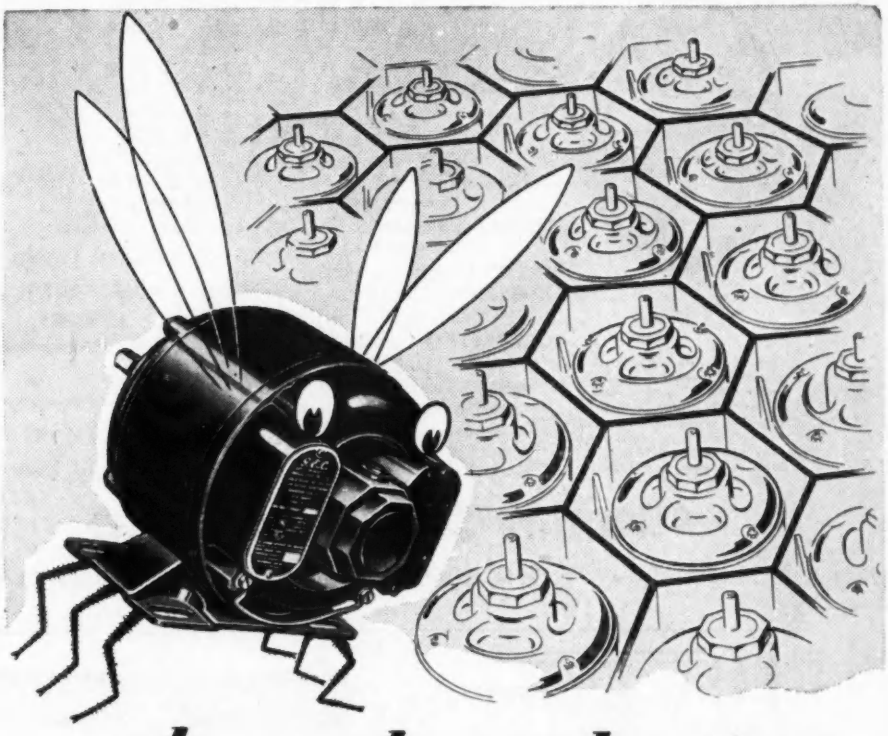

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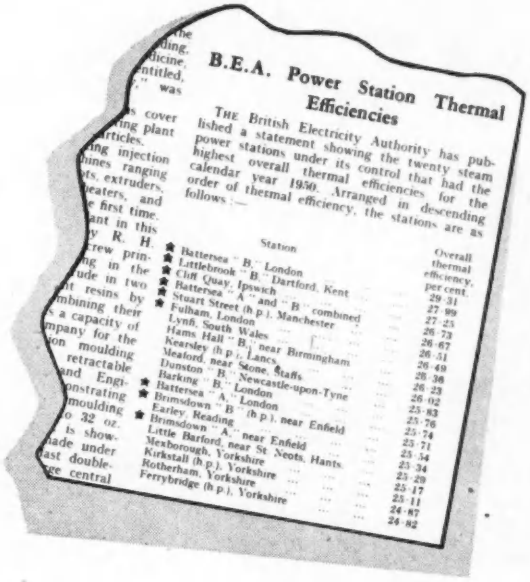

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Lynn, South Wales	26·49
Hams Hall "B," near Birmingham	26·36
Kearsley (h.p.), Lancs.	26·23
Meaford, near Stone, Staffs.	26·02
Dunston "B," Newcastle-upon-Tyne	25·93
Barking "B," London	25·76
★ Battersea "A," London	25·74
★ Brimsdown "B" (h.p.), near Enfield	25·71
Earley, Reading	25·54
★ Brimsdown "A," near Enfield	25·34
Little Barford, near St. Neots, Hants.	25·29
Mexborough, Yorkshire	25·17
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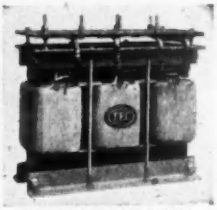

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Before and After

By courtesy of F. H. Clinch, Esq., A.M.I.C.E., M.I. Mun. E., Borough Engineer and Surveyor

Here you see Dorchester Road, Weymouth, before and after the installation of 113 REVO open type sodium lanterns (No. C 13192) on REVO concrete columns. Need we say more—the pictures speak for themselves—what better recommendation could one have for REVO Equipment.

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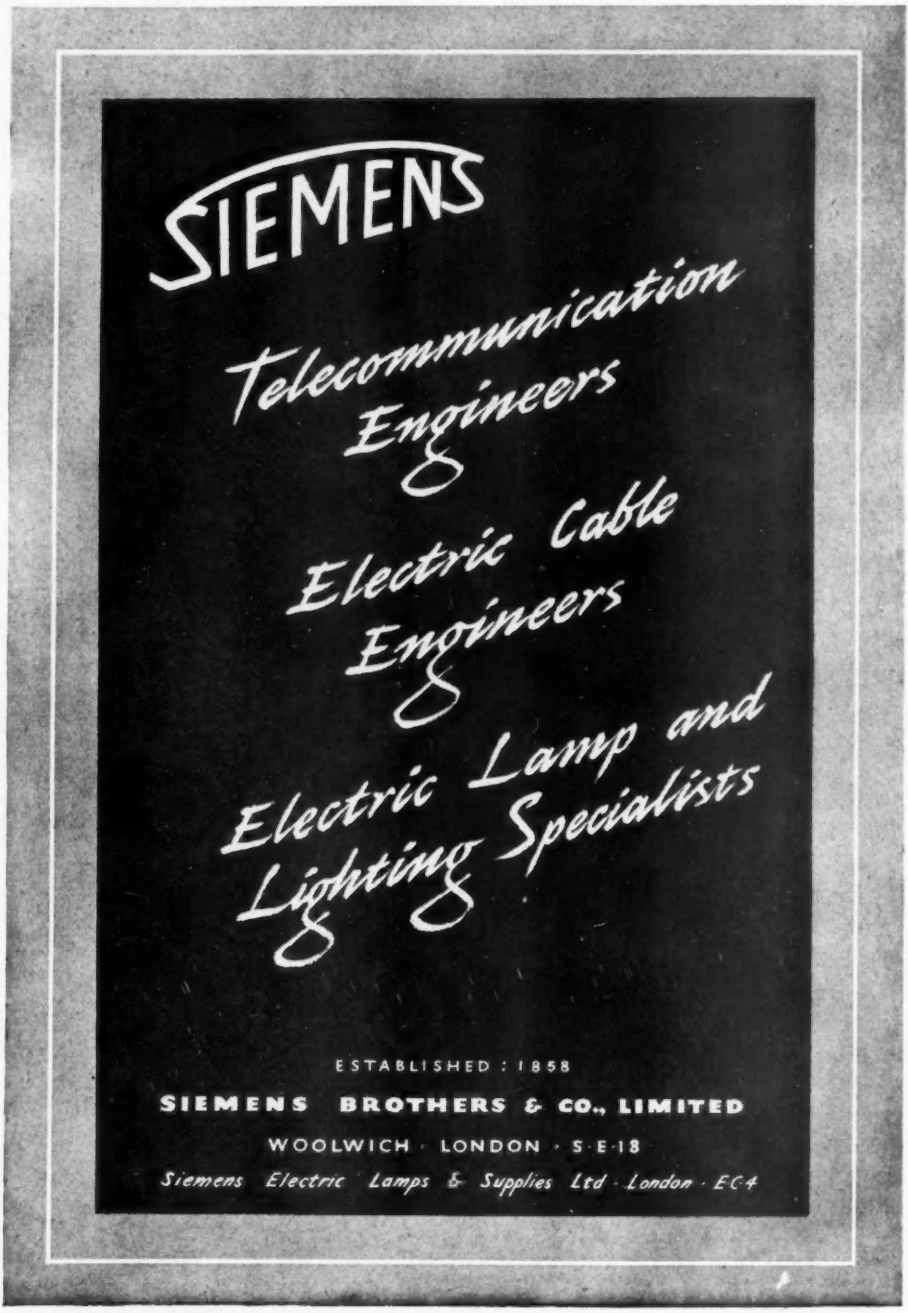
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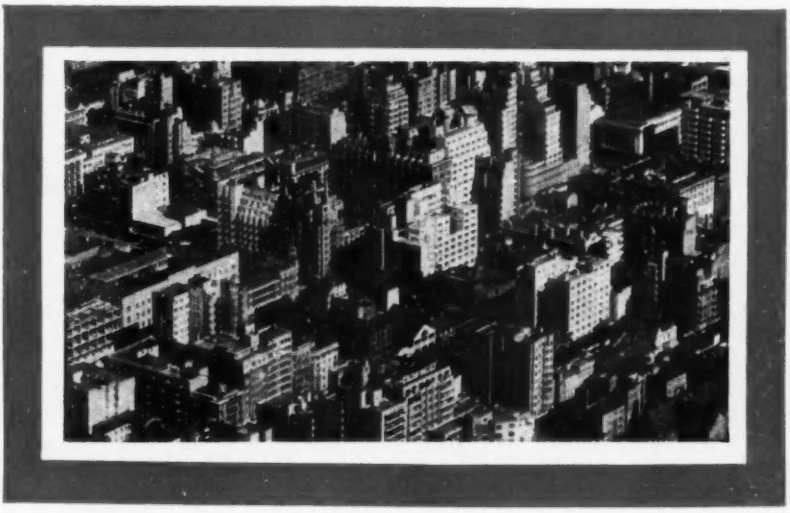
TRANS-WORLD QUIZ

✱

What City is this? **What** Country has no natural lakes?
What Member of the British Commonwealth has two Capitals?



WELL! The City is not American. It is Johannesburg, in South Africa. And, believe it or not, South Africa has no natural lakes and no rivers that are navigable for any distance. Also, it has two Capitals — Pretoria and Cape Town.

A very important country is South Africa, for it is the world's largest supplier of gold. And in return for exporting that gold it imports goods from many countries including Great Britain.

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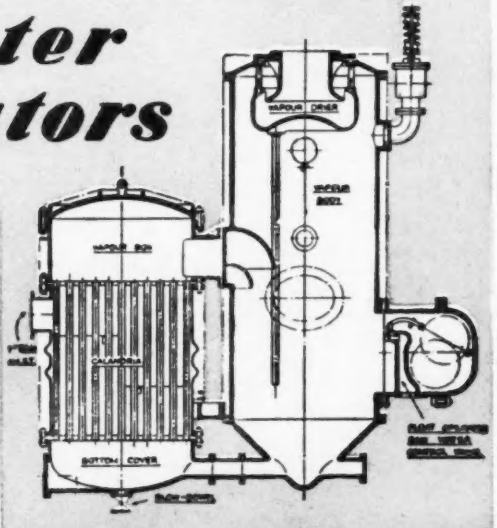

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